



# ControlLogix Gateway Driver Help

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*Gateway Driver for  
A-B ControlLogix Networks*

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## **CONTROLLOGIX GATEWAY DRIVER HELP**

### **ControlLogix Gateway™ Driver for Allen-Bradley® ControlLogix Networks**

#### **Version 9**

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## INTRODUCTION

The ControlLogix Gateway Driver lets you access Data Highway Plus and DH-485 networks from a remote location through a ControlLogix gateway module. It provides complete DHX functionality to the client node for solicited communication.

With this driver, a remote system can communicate over a standard Ethernet network to a ControlLogix chassis containing a 1756-DHRIO or 1756-DH485 module. That module then acts as a gateway to a Data Highway Plus or DH-485 network, allowing the remote system to access PLC-5s, SLC-500s or any other devices on the network, as though it were connected directly to that network.

This driver is part of Cyberlogic's DHX Driver Suite, DHX OPC Server Suite, DHX OPC Premier Suite and DHX OPC Enterprise Suite, providing remote Data Highway access for these products.

## Running 16-Bit Software

The Virtual DHX Driver, which is included with all DHX products, allows 16-bit applications to run concurrently with all 32-bit applications on the same computer. It is compatible with all 16-bit DOS/Windows applications that communicate through the 1784-KT or 1784-KTX adapter cards, such as 6200 programming software. For more information, refer to the [Virtual DHX Driver](#) section.

## Compatibility

The ControlLogix Gateway Driver is implemented as part of the Cyberlogic DHX architecture, which is the foundation used in other DHX family drivers such as the Serial DHX Driver, the DHX Driver and the DHX Gateway Driver. Consequently, these drivers consistently support identical programming interfaces: DHXAPI, DHXAPI.Net and 6001-F1E. Supporting these existing standards protects the software and R&D investments of end-users and OEMs.

Software developers can use the DHX Software Development Kit (DHX SDK) to obtain connectivity to DH, DH+, DH-485, ControlNet and Ethernet TCP/IP networks for their applications. Applications developed with the DHX SDK can be used with all DHX family drivers and can execute under all current Windows operating systems.

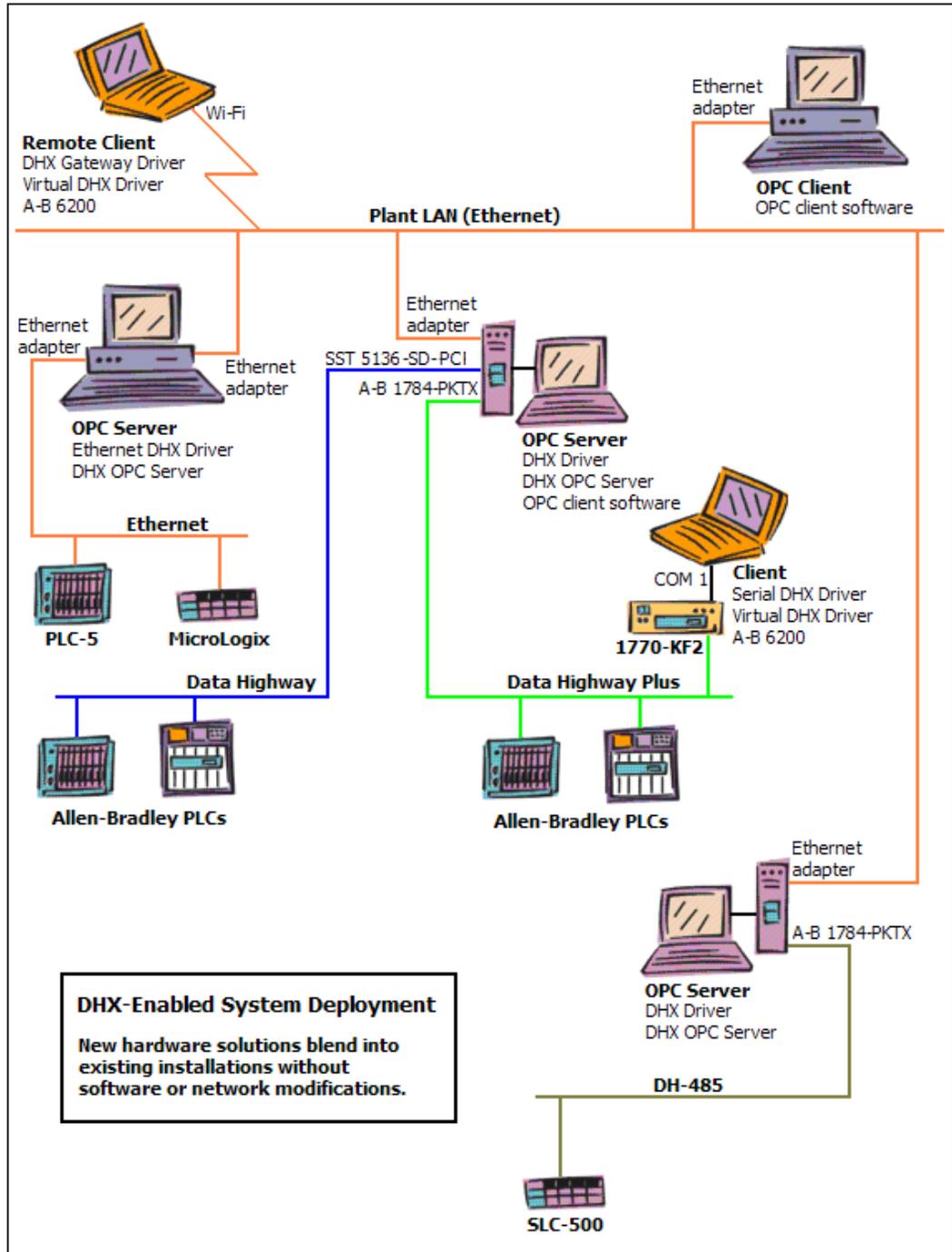
## Blending DHX Supported Networks

The DHX driver family provides support for all Allen-Bradley networks through a common architecture, with identical programming interfaces. This means that an application that operates with one of the DHX family drivers, such as the ControlLogix Gateway Driver, will work with the rest of them as well. Thus, virtually all Allen-Bradley compatible software programs can operate over all networks supported by A-B with no code modifications. You will find a complete description of the DHX family in the [Appendix B: DHX Architecture and Companion Products](#).

Migration of existing installations to new hardware products does not require the user to discard working, proven software solutions. As depicted in the diagram below, a user can mix Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet based hardware products in existing installations without losing software, network or integration investment.

The DHX family of products includes:

- [DHX Driver](#) is Cyberlogic's device driver for Data Highway, Data Highway Plus, and DH-485 adapter cards from Allen-Bradley and SST.
- [Ethernet DHX Driver](#) provides Data Highway Plus emulation over TCP/IP.
- [Serial DHX Driver](#) is a full-duplex DF1 protocol driver for Data Highway, Data Highway Plus, DH-485 and ControlNet networks over serial COM port connections.
- [DHX Gateway Driver](#) works with the other DHX drivers, giving access to Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks from remote locations.
- [ControlLogix Gateway Driver](#) provides remote access to Allen-Bradley's Data Highway Plus network by letting you access 1756-DHRIO gateway modules in a ControlLogix chassis from a remote location.
- [Virtual DHX Driver](#) works with the other DHX drivers to permit 16-bit legacy software to run in current Windows operating systems.
- [DHX OPC Server](#) connects OPC-compliant client software applications to data sources over all Allen-Bradley networks.
- [DHX SDK](#) is a software development kit for DHXAPI, DHXAPI.Net and 6001-F1E compliant development.



**DHX-Enabled System Deployment**  
New hardware solutions blend into existing installations without software or network modifications.

## WHAT SHOULD I DO NEXT?

The links below will take you to the section of this manual that contains the information you need to configure, use and troubleshoot the ControlLogix Gateway Driver.

### Learn How the Driver Works

If you are not familiar with the way that the ControlLogix Gateway Driver handles communication, you should begin by reading [Communication Using the ControlLogix Gateway Driver](#).

### Read a Quick-Start Guide

First-time users of the ControlLogix Gateway Driver will want to read the [Quick-Start Guide](#), which walks through a typical configuration session, step-by-step.

### Get Detailed Information on the Configuration Editors

Experienced users who want specific information on features of the configuration editors will find it in the [Configuration Editor Reference](#) section.

### Verify That It's Working or Troubleshoot a Problem

If you have already configured the driver, you should verify that it operates as expected. Refer to the [Validation & Troubleshooting](#) section for assistance. In case of communication problems, this section also provides problem-solving hints.

### Get Information on Related Products

The DHX family consists of several well-integrated products, which provide connectivity for Allen-Bradley networks in distributed environments. For more information about these products, refer to the [Appendix B: DHX Architecture and Companion Products](#) section.

### Print a Copy of This Document

The content of this document is also provided in PDF format. PDF files can be viewed using the Adobe® Reader program, and can also be used to print the entire document.

### Contact Technical Support

To obtain support information, open the Windows **Start** menu and go to **Cyberlogic Suites**, and then select **Product Information**.

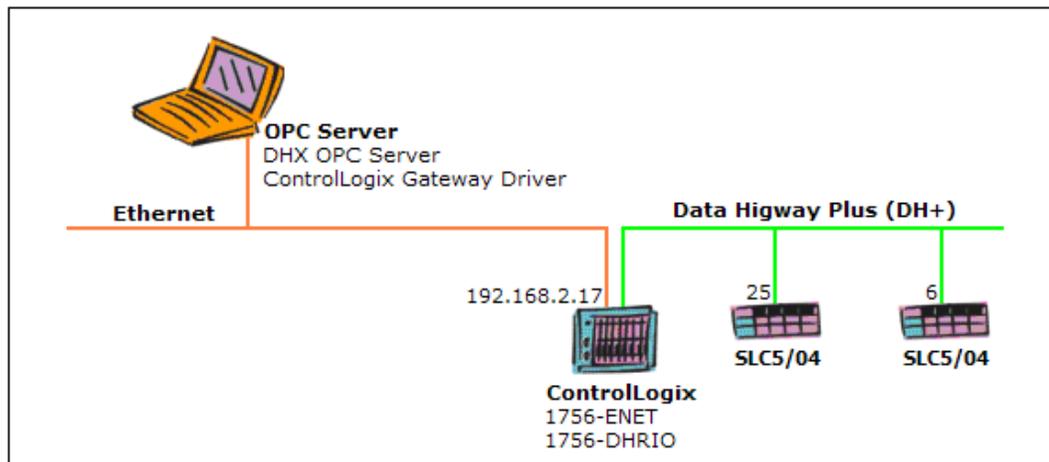
## COMMUNICATION USING THE CONTROLLOGIX GATEWAY DRIVER

The ControlLogix Gateway Driver allows systems on an Ethernet network to access nodes on a Data Highway Plus or DH-485 network by passing the messages through modules in a ControlLogix chassis. The chassis must be equipped with an Ethernet module and a 1756-DHRIO module for DH+ communication or a 1756-DH485 module for DH-485 communication. The system running the ControlLogix Gateway Driver will then be able to send messages to the chassis via Ethernet, and these will be passed over the backplane to the 1756-DHRIO or 1756-DH485 for retransmission to the target node over DH+ or DH-485, respectively. Responses are then passed in the reverse direction, providing two-way communication.

The application software will address the target PLCs by their DH+ node addresses. The driver appends the specified node address to a pre-configured partial CIP path to create the complete CIP path needed for the message. This technique allows unmodified applications to use the ControlLogix Gateway Driver, because they can address the nodes just as though they were on a local DH+ network. (For more information on CIP paths, refer to [Appendix A: CIP Paths.](#))

### Typical ControlLogix Gateway Driver Architecture

The figure below shows a typical use of the ControlLogix Gateway Driver to communicate to a remote DH+ network.



In this setup, the notebook is running the DHX OPC Server and uses the ControlLogix Gateway Driver to obtain data from the SLCs on the DH+ network.

The ControlLogix chassis has a 1756-ENET module in slot 3, and it is assigned IP address 192.168.2.17. In slot 4 of the chassis is a 1756-DHRIO module, and DH+ channel B of that module connects to the DH+ network that services the SLC controllers. The partial CIP path configured in the ControlLogix Gateway Driver would be: 192.168.2.17, 1, 4.B.

To address the SLC at node address 6, the application specifies only that node address. The driver appends that to the partial CIP path, creating the complete CIP path

192.168.2.17, 1, 4.B, 6. It then sends the message to IP address 192.168.2.17, which is the 1756-ENET module.

The 1 in the CIP path instructs the Ethernet module to pass the message to the ControlLogix backplane. The next value in the CIP path is 4, so the message is routed to the module in slot 4, which is the 1756-DHRIO module. That module then sends the message to its DH+ channel B, as specified by the B in the CIP path, and addresses it to DH+ node 6.

Notice, that the slot number of the 1756-ENET module (slot 3) is immaterial, and therefore not part of the path. For a detailed discussion of the CIP path syntax and more examples, refer to [Appendix A: CIP Paths](#).

The above example is the simplest, most basic setup. More complex architectures are possible. For example:

- You can communicate with two separate DH+ networks by using both channels of the 1756-DHRIO.
- You can have more than one 1756-DHRIO in a chassis, and communicate through both channels on each of those modules.
- You can communicate through multiple ControlLogix chassis, which may be on separate Ethernet networks.

In each of the above scenarios, you do this by simply creating additional ControlLogix Gateway Devices for each DH+ channel you wish to use.

Configurations using the 1756-DH485 module to communicate to a remote DH-485 network would be handled in an identical manner.

## Main Driver Features

In general, the driver supports all Allen-Bradley network features for solicited communication. Unsolicited messages are not supported by the ControlLogix Gateway devices.

Since the DHX Gateway Driver uses the same Application Programming Interface (API) as the rest of the DHX drivers, applications designed to work with one of the DHX drivers will work with the ControlLogix Gateway Driver as well. Refer to the [DHX SDK](#) section in the DHX Architecture and Companion Products appendix for more information.

## Solicited Communications

I/O requests that are initiated by an application program are called solicited requests. These transactions are carried over abstract communication ports called solicited channels.

Each solicited channel is capable of carrying out one solicited transaction at a time. Once a command message is sent through a channel, no more command messages are allowed through this channel until a reply message is received, a timeout occurs, or the transaction is canceled.

A single solicited channel can be used to communicate to multiple network nodes. Therefore, simple applications can perform all of their solicited communications through a single channel. However, applications can typically achieve much greater performance by using multiple solicited channels, because the transactions carried over these channels are executed simultaneously.

## QUICK-START GUIDE

Before the ControlLogix Gateway Driver can be used, it must be properly configured. The driver uses 1756-DHRIO modules in remote ControlLogix chassis as its Data Highway Plus interface adapters, and 1756-DH485 modules as its DH-485 adapters. ControlLogix Gateway Driver configuration involves the creation of one or more DHX devices that access these modules.

To accomplish this, you must run the DHX Driver Configuration Editor after you install the software. The DHX Driver Configuration Editor is a common component of all drivers in the DHX family. When configuring a ControlLogix Gateway Driver device, the DHX Driver Configuration Editor automatically dispatches the ControlLogix Gateway Editor.

The following steps show a typical configuration session. Use it only as a guideline of how to configure the most common features. For detailed descriptions of all of the available features, refer to the [Configuration Editor Reference](#) section.

The procedure is broken into several short segments:

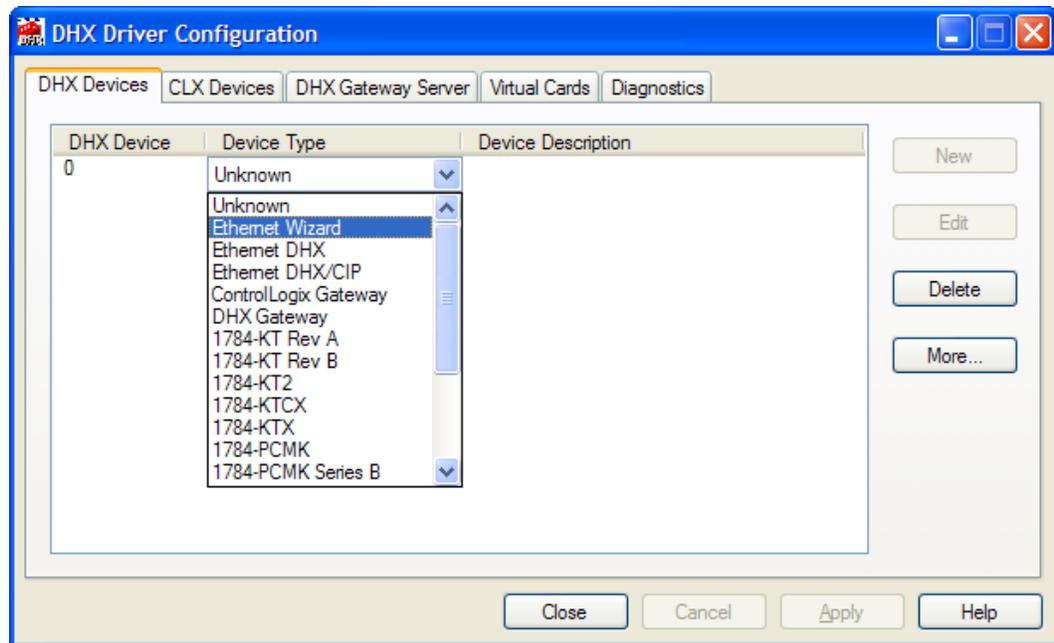
- [Creating and Configuring a ControlLogix Gateway Device](#)
- [Configuring the ControlLogix Gateway Driver Control](#)
- [Verifying Your Driver Configuration](#)
- [Backing Up Your Configuration](#)

After completing this procedure, you will have a fully-configured device and will be able to confirm that the driver is running and communicating with other nodes on your network.

To begin, go to [Creating and Configuring a ControlLogix Gateway Device](#).

## Creating and Configuring a ControlLogix Gateway Device

The first step in configuring the ControlLogix Gateway Driver is to create a ControlLogix Gateway device that will emulate a physical DH+ or DH-485 network adapter. While you can simply select ControlLogix Gateway from the list of available device types, we will illustrate the use of the Ethernet Wizard, which can help you decide the proper device type for your installation. For this example, we will use DH+ as the remote network.

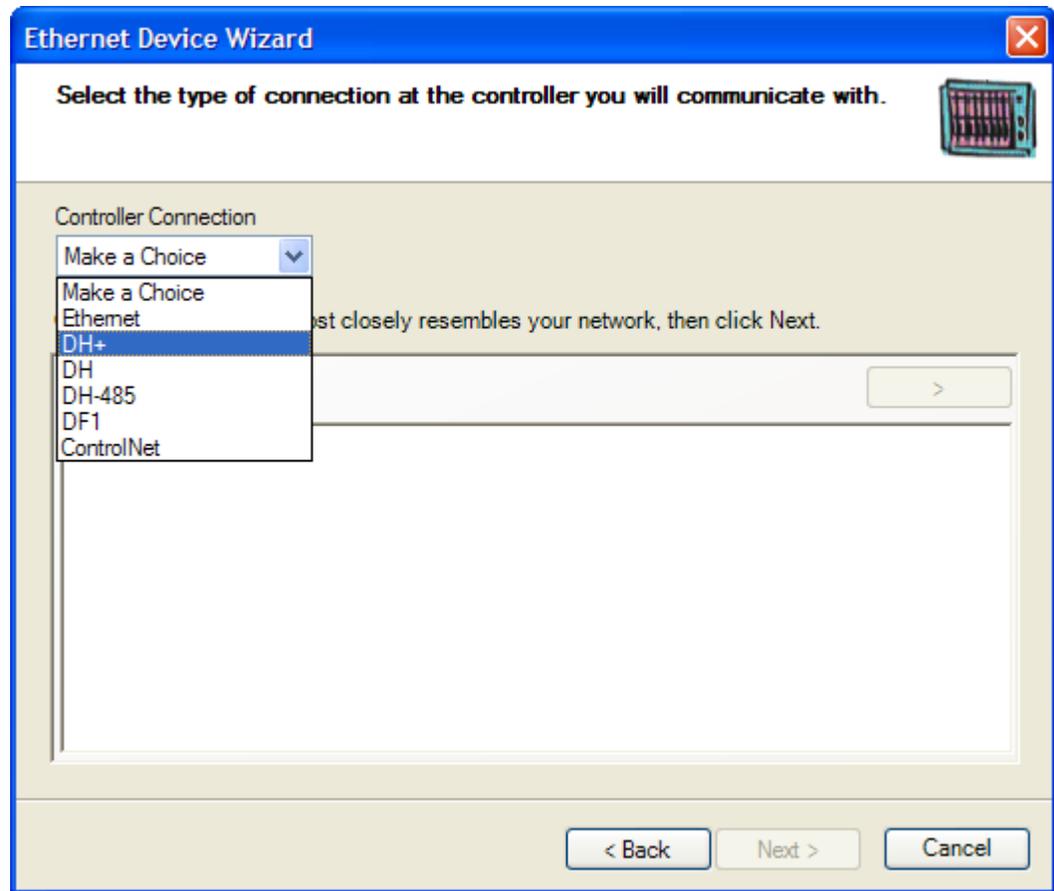


1. Select the **DHX Devices** tab.
2. Click the **New** button.
3. From the drop-down list, select **Ethernet Wizard**.



The editor will launch the wizard.

4. Click **Next** to continue.



5. From the **Controller Connection** drop-down list, select **DH+** as the type of network connection that is used at the controller you wish to communicate with.



The wizard will show you one or more pictures that illustrate the types of setups that are supported under the controller connection you chose.

6. If two or more possibilities are available, use the **arrow buttons** to scroll through them to find the picture that resembles your network.

In this case, we chose the illustration that shows an Ethernet connection from the PC to a chassis, with a Data Highway Plus connection from that chassis to the target controller.

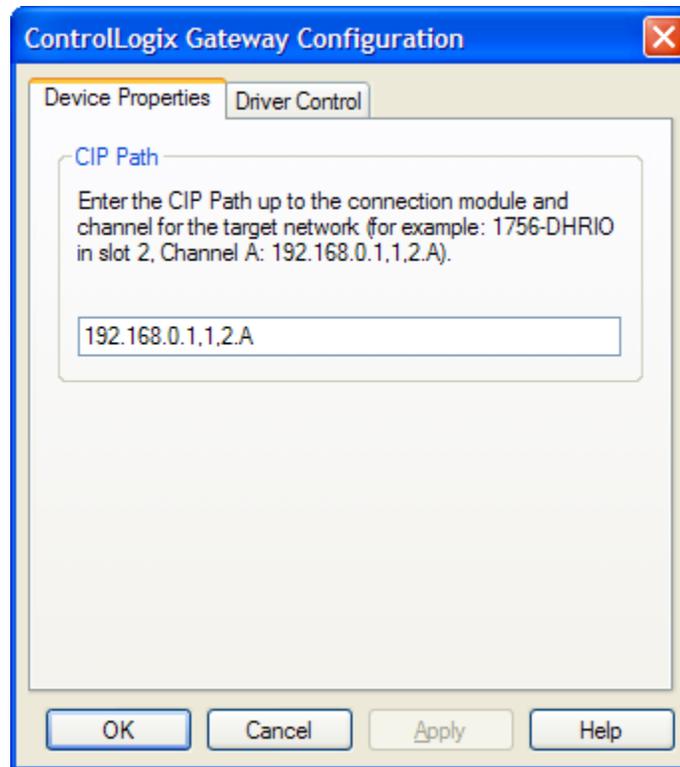
7. Click **Next** to continue.



The wizard will report the device type to be created.

8. Click Finish to create the device and exit from the wizard.

The DHX Driver Configuration editor will automatically dispatch the ControlLogix Gateway Configuration editor.



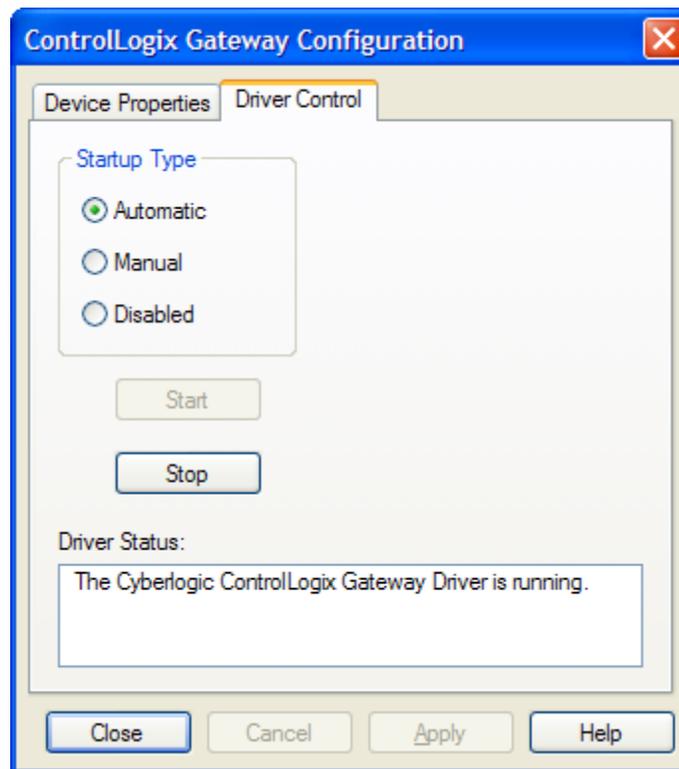
9. Enter the **CIP Path** up to the module and channel that connects to the target Data Highway Plus network. Do not include the final DH+ node address; the driver will append this at run time.

Refer to [Appendix A: CIP Paths](#) for information on CIP path syntax.

10. If you wish to access more than one ControlLogix chassis or other modules in the same chassis, you will need to configure another ControlLogix Gateway device for each chassis or module by repeating this section.

Go to [Configuring the ControlLogix Gateway Driver Control](#) to continue.

## Configuring the ControlLogix Gateway Driver Control



1. Select the **Driver Control** tab.
2. Select the desired mode of operation among the **Startup Type** choices.

If you want the driver to start automatically when Windows boots, select **Automatic**. This is the recommended setting.

If you want to control the driver manually, select **Manual**.

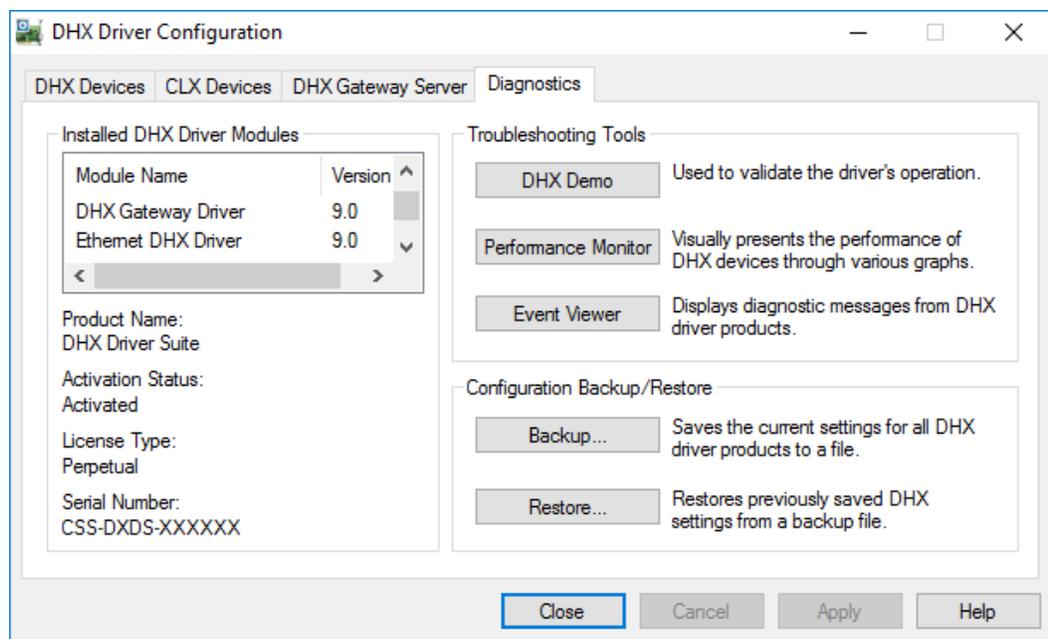
To prevent the driver from running, select **Disabled**.

3. Click **Close** to return to the DHX Driver Configuration editor.

Now go to the [Verifying Your Driver Configuration](#) section, which will introduce you to the diagnostic features of the product.

## Verifying Your Driver Configuration

The Diagnostics tab features will help you to confirm that the driver is running and is properly configured. They will also provide important help in case troubleshooting or technical support is needed.



1. Select the ***Diagnostics*** tab.
2. The left pane of this screen shows all DHX product components installed on your system. This information, including the version numbers, may be requested if you call for technical support.

This screen also tells you if the software has been activated or if it is running in the two-hour demo mode.

### Caution!

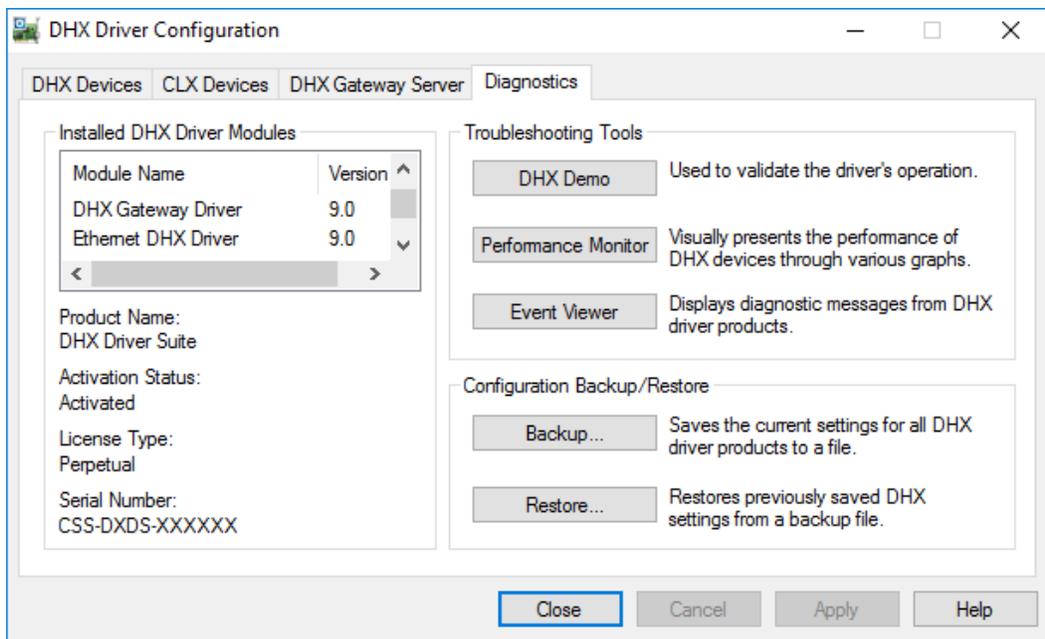
If you are running in demo mode, the DHX products will stop after two hours of operation and will resume after the system is restarted.

3. The right pane of the screen provides shortcuts to troubleshooting and backup/restore tools. Run the ***DHX Demo*** program after configuring the DHX Driver to verify that the driver is configured and running properly. Detailed instructions for running this utility are included in the [Validation & Troubleshooting](#) section.

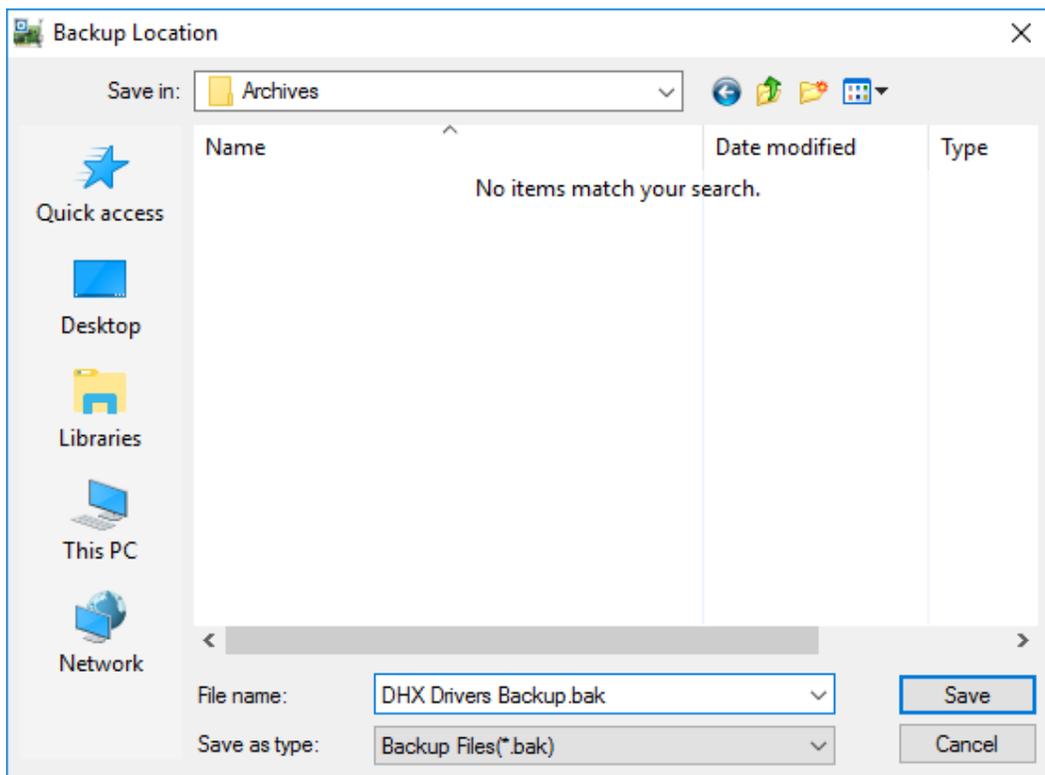
When you are satisfied that the driver is correctly configured, proceed to [Backing Up Your Configuration](#).

## Backing Up Your Configuration

To protect the work that you put into configuring and testing the driver, we strongly recommend that you back up the configuration.



1. Select the **Diagnostics** tab of the DHX Driver Configuration editor.
2. Click the **Backup...** button.



3. Browse for the desired backup directory. By default, the last-used directory is selected.

4. Enter the ***File name*** you want to use for your configuration backup file, and then click the ***Save*** button to complete the backup operation.

## CONFIGURATION EDITOR REFERENCE

Before the ControlLogix Gateway Driver can be used, it must be properly configured. The driver uses 1756-DHRIO modules in remote ControlLogix chassis as its Data Highway Plus interface adapters, and 1756-DH485 modules as its DH-485 adapters. ControlLogix Gateway Driver configuration involves the creation of one or more DHX devices that access these modules.

This section provides a detailed description of each of the configuration editor features. If you are a new user and want a procedure to guide you through a typical configuration session, refer to the [Quick-Start Guide](#).

To create the needed ControlLogix Gateway device, you must run the [DHX Driver Configuration Editor](#) after you install the software. The DHX Driver Configuration Editor is a common component of all DHX family drivers.

When configuring a ControlLogix Gateway device, the DHX Driver Configuration Editor automatically dispatches the [ControlLogix Gateway Configuration Editor](#).

### DHX Driver Configuration Editor

The DHX Driver Configuration Editor is a common component of all drivers in the DHX family. It is used to create DHX and CLX devices, configure the DHX Gateway Server and provide access to diagnostic information and utilities. When you create or edit a device, the DHX Driver Configuration Editor automatically dispatches the proper device configuration editor.

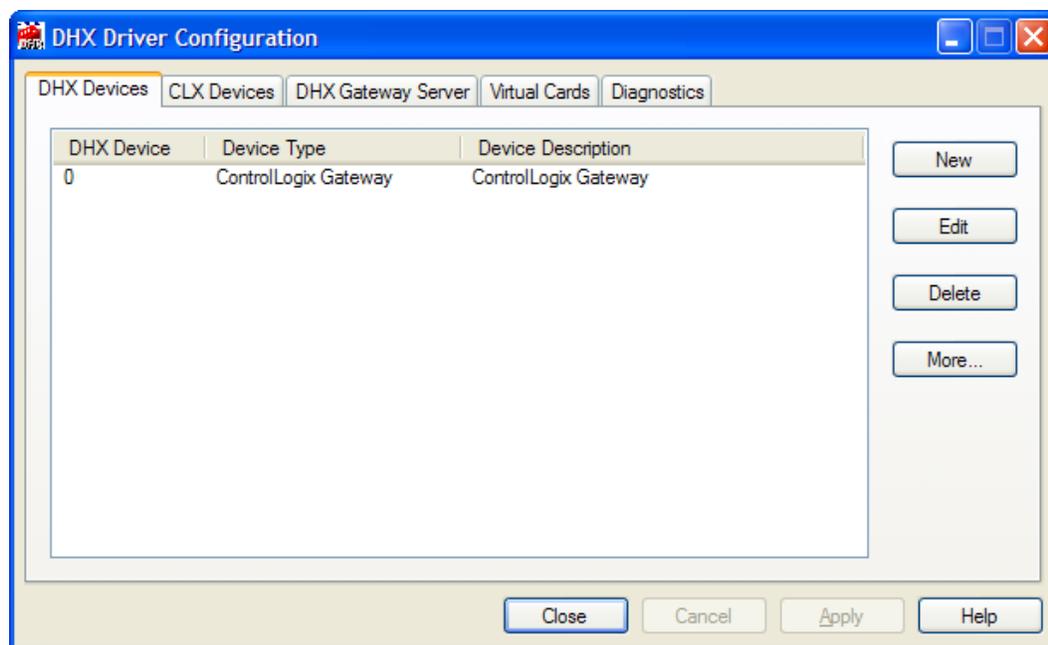
The DHX Driver Configuration editor consists of five tabs:

- [DHX Devices Tab](#)
- [CLX Devices Tab](#)
- [DHX Gateway Server Tab](#)
- [Virtual Cards Tab](#)
- [Diagnostics Tab](#)

The following sections provide complete descriptions of these tabs.

#### DHX Devices Tab

DHX devices are logical devices that are used to communicate to Programmable Logic Controllers, such as MicroLogix, SLC-500, PLC-5, PLC-3 and PLC-2. Every DHX device must be configured on the DHX Devices tab before it can be used by client applications, such as the DHX OPC Server. The DHX Devices tab lists all currently configured DHX devices in your system. The information is shown in three columns: DHX Device, Device Type and Device Description.



### DHX Device

This column contains a number that the editor assigns to every DHX device installed in the system. This is not the DH/DH+ node address. By default, the editor will try to use consecutive numbers for the devices starting from zero. However, this is not a requirement.

### Device Type

This column identifies the type of the DHX device, such as 1784-KTX, Ethernet DHX or ControlLogix Gateway.

### Device Description

This is user-assigned text for describing a device. During device creation, a default description text will be assigned. Refer to the Changing Device Description section, below, for information on how to modify this text.

The device description text has no effect on the DHX device operation. However, some applications using this device may be able to show this text.

### New

Click this button to create a new DHX device.

### Edit

Select a DHX device and click this button to edit it.

### Delete

Select a DHX device and click this button to delete it.

### More...

Select a DHX device and click this button for additional editing features. You can change the device type or edit the Device Description field.

### **Creating a New DHX Device**

Click the **New** button or right-click inside the list window and select **New** from the context menu. Then select an adapter card or other device type from the drop-down list.

Upon selecting the device type, the DHX Driver Configuration editor will automatically dispatch the configuration editor that is appropriate for that device.

### **Deleting an Existing DHX Device**

Select the device and click the **Delete** button or right-click and select **Delete** from the context menu.

### **Editing an Existing DHX Device Configuration**

Select the device, click the **Edit** button or right-click and select **Edit** from the context menu. The DHX Driver Configuration editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend on the selected device type.

### **Changing Device Description**

Select the device, click the **More...** button or right-click and select **Edit Description** from the context menu. Modify the device description and press the **Enter** key when you are done.

### **Changing Device Type**

Select the device and click the **More...** button or right-click and select **Change Type** from the context menu. From the drop-down list, select the new device type for the DHX device. Upon selecting the new device type, the DHX Driver Configuration editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend upon the device type selected.

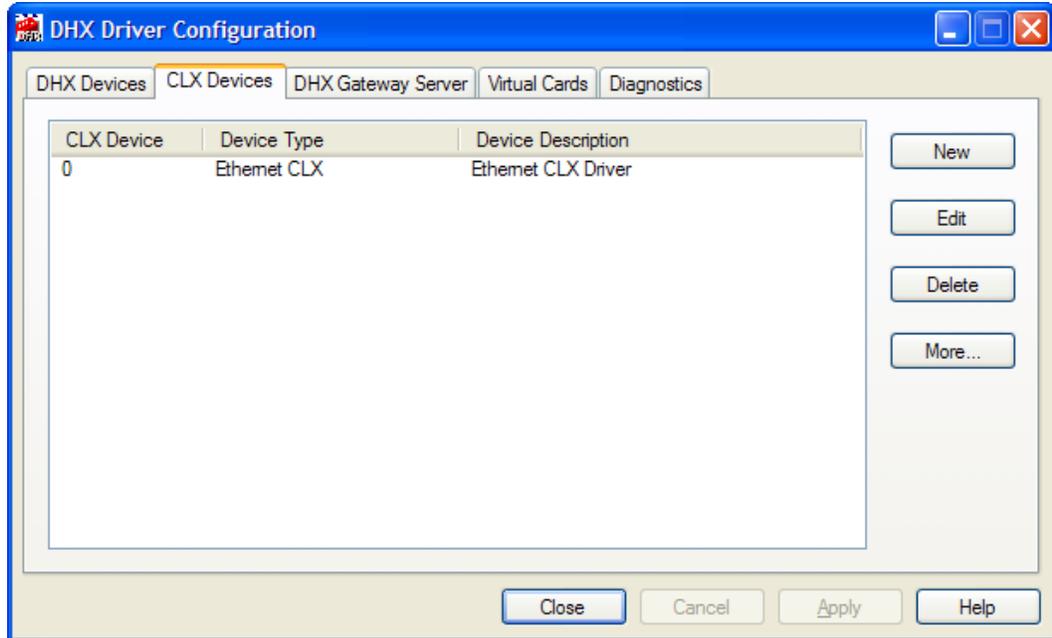
## **CLX Devices Tab**

CLX devices are logical devices that are used to communicate to the Logix family of Programmable Automation Controllers, such as ControlLogix, CompactLogix and FlexLogix. Every CLX device must be configured on the CLX Devices tab before it can be used by the DHX OPC Server. The CLX Devices tab lists all currently configured CLX

devices in your system. The information about each device is shown in three columns: CLX Device, Device Type and Device Description.

**Note**

Ethernet CLX and CLX over DHX devices are used only with the Cyberlogic DHX OPC Server and are available only if you have installed the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite. Otherwise, the Ethernet CLX and CLX over DHX device types will not be available, and this tab will not appear in the editor. For more information on CLX devices, refer to the DHX Driver help.



### CLX Device

This column contains a number that the editor assigns to every CLX device installed in the system. By default, the editor will try to use consecutive numbers for the devices starting from zero. However, this is not a requirement.

### Device Type

This column identifies the type of the CLX device, such as Ethernet CLX or CLX over DHX.

### Device Description

This is user-assigned text for describing a device. During device creation, a default description text will be assigned. Refer to the Changing Device Description section, below, for information on how to modify this text.

The device description text has no effect on the CLX device operation. However, some applications using this device may be able to show this text.

### *New*

Click this button to create a new CLX device.

### *Edit*

Select a CLX device and click this button to edit it.

### *Delete*

Select a CLX device and click this button to delete it.

### *More...*

Select a CLX device and click this button for additional editing features. You can change the device type or edit the Device Description field.

## ***Creating a New CLX Device***

Click the ***New*** button or right-click inside the list window and select ***New*** from the context menu. Then select the desired device type from the drop-down list.

Upon selecting the device type, the DHX Driver Configuration editor will automatically dispatch the appropriate device editor.

## ***Deleting an Existing CLX Device***

Select the device and click the ***Delete*** button or right-click and select ***Delete*** from the context menu.

## ***Editing an Existing CLX Device Configuration***

Select the device, click the ***Edit*** button or right-click and select ***Edit*** from the context menu. The DHX Driver Configuration editor will automatically dispatch the appropriate device configuration editor. The screen that follows will depend upon the selected device type.

## ***Changing Device Description***

Select the device and click the ***More...*** button or right-click and select ***Edit Description*** from the context menu. Modify the device description and press the ***Enter*** key when you are done.

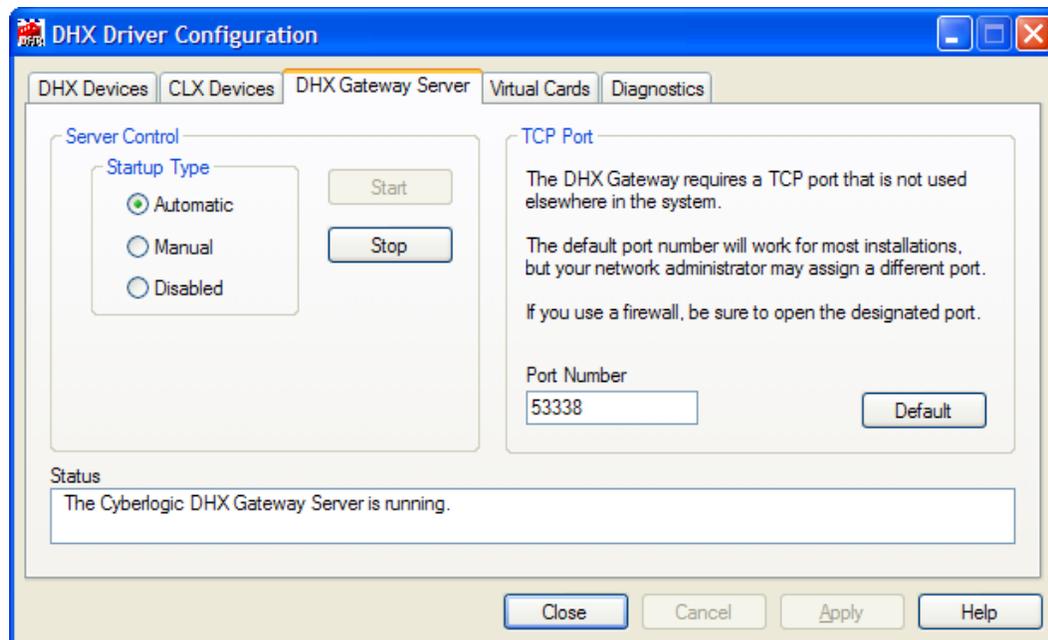
## ***Changing Device Type***

Select the device, click the ***More...*** button or right-click and select ***Change Type*** from the context menu. From the drop-down list, select the new device type for the CLX device. Upon selecting the new device type, the DHX Driver Configuration editor will

automatically dispatch the appropriate device configuration editor. The screen that follows will depend upon the device type selected.

## DHX Gateway Server Tab

All DHX suites include the DHX Gateway Server, a remote connectivity component of the DHX family. The DHX Gateway Server allows remote nodes to access all configured DHX devices present on the system that is running the DHX Gateway Server. Refer to the DHX Gateway Driver help file for more information on this capability.



### ***Server Control***

This section allows you to designate if and how you want the DHX Gateway Server to start.

#### Automatic

When this option is selected, the DHX Gateway Server will start when Windows boots.

#### Manual

When this option is selected, the DHX Gateway Server will not start when Windows boots, but you can control it manually using the Start and Stop buttons.

#### Disabled

When this option is selected, the DHX Gateway Server will not run.

### Start

In Automatic or Manual mode, click this button to start the DHX Gateway Server.

### Stop

In Automatic or Manual mode, click this button to stop the DHX Gateway Server.

### **Status**

This tells you whether the DHX Gateway Server is running, stopped, starting or stopping.

### **TCP Port**

The port used here must not be used elsewhere in the system. If your system uses a firewall, the port must be opened in the firewall configuration. For details on how to do this, refer to the [Configuring the Firewall](#) section.

### Port Number

Enter the number of the TCP port you wish to use.

### Default

Click this button to restore the TCP port value to its default setting of 53338.

### **Selecting the Startup Type**

If you want to use the DHX Gateway Server and want it to start whenever the system is booted, select **Automatic**. This is the recommended setting for systems that will use the Gateway Server.

If you want to use the DHX Gateway Server and want to control it manually, choose **Manual**. The Server will not start on boot-up; instead you must use the Start and Stop buttons to control it.

If you do not want to use the DHX Gateway Server, choose **Disabled**.

### **Start/Stop the Gateway Server**

Click the **Start** or **Stop** button.

### **Selecting the TCP Port**

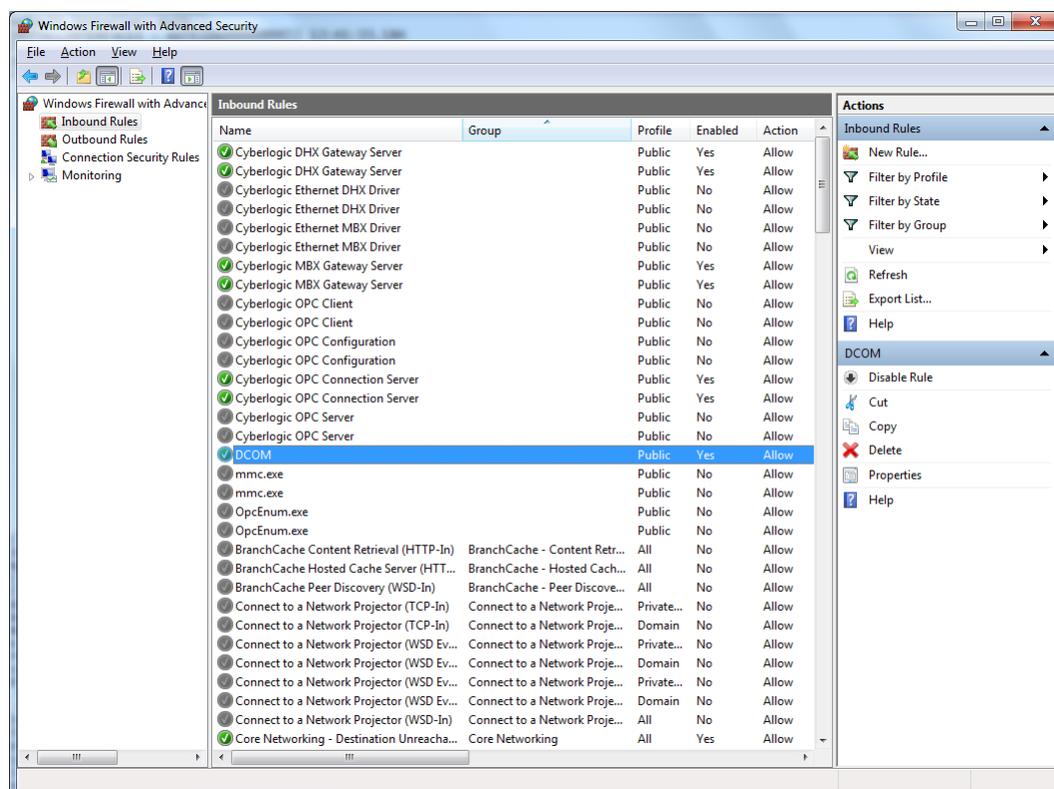
Enter the desired port number in the Port Number field.

You must enter a TCP port that is not used elsewhere in the system. The default, 53338, will work for most installations, but this port may be taken in some unusual cases. If that applies to your system, the system administrator will assign a different port.

## Configuring the Firewall

If your system uses a firewall, you must configure it to permit MBX Gateway communication. The procedure shown here is for the Windows 7 firewall. The exact procedure for your system will depend upon the firewall you are using, but the issues are the same for all firewall types.

1. To configure Windows 7's firewall, go to **Control Panel** and open **Windows Firewall** and select **Advanced Settings**.



2. Select **Inbound Rules**.
3. Verify that the rules **Cyberlogic DHX Gateway Server** and **DCOM** are enabled. If not, enable them.
4. Close the window to exit.

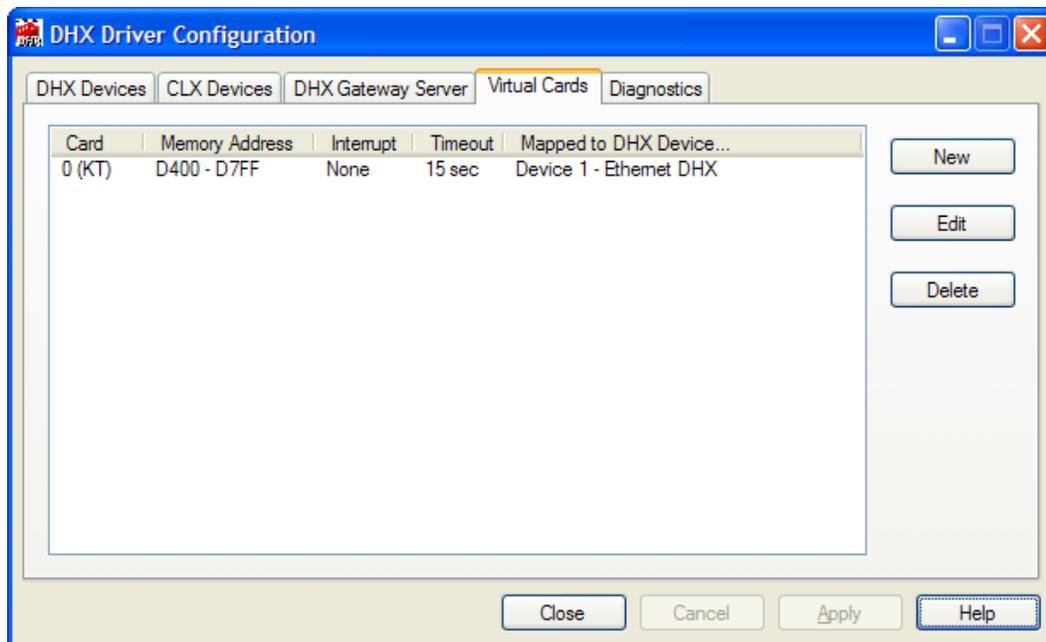
## Virtual Cards Tab

Virtual cards allow legacy 16-bit DOS and Windows applications to use any of the DHX devices you have configured in your system. They do this by making those devices appear to function as 1784-KT or 1784-KTX cards.

### Note

The Virtual Cards tab will appear in the editor only if the Virtual DHX Driver option is installed. For more information on Virtual DHX Driver, refer to the Virtual DHX Driver help.

The Virtual Cards tab lists all currently-configured virtual cards. The information is provided in five columns: Card, Memory Address, Interrupt, Timeout and Mapped to DHX Device....



### Card

This column displays a number that the editor assigns to every virtual adapter card and also indicates the card type (KT or KTX).

### Memory Address

This is the memory address range allocated to the virtual adapter card.

### Interrupt

This is the interrupt IRQ line to be emulated by the virtual adapter card. If it is *None*, then the virtual card will operate in polled mode.

### Timeout

This is the message timeout value for the virtual adapter card.

### Mapped to DHX Device...

This is the actual DHX device used by the virtual adapter card for all of its communications.

*New*

Click this button to create a new virtual card.

*Edit*

Select a virtual card and click this button to edit it.

*Delete*

Select a virtual card and click this button to delete it.

***Creating a New Virtual Card***

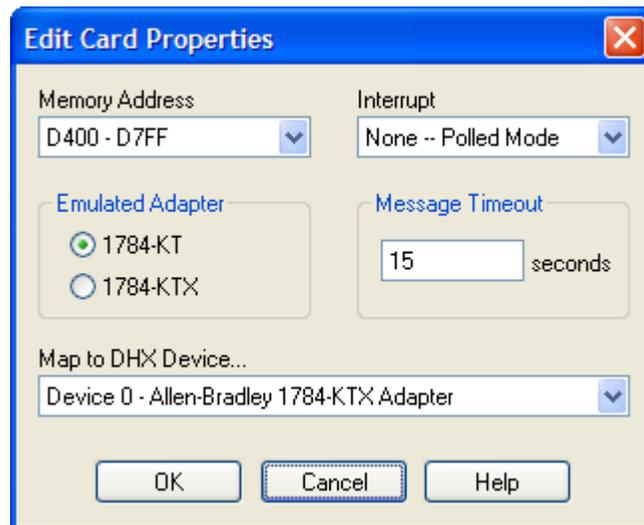
Click the ***New*** button or right-click inside the list window and select ***New*** from the context menu. The Edit Card Properties window will open to allow you to configure the new virtual card.

***Deleting an Existing Virtual Card***

Select the virtual card and click the ***Delete*** button or right-click and select ***Delete*** from the context menu.

***Editing an Existing Virtual Card***

Select an existing virtual adapter card and click the ***Edit*** button or right-click and select ***Edit*** from the context menu. In either case, the following dialog will appear.



*Memory Address*

This is the memory address range allocated to the virtual adapter card. This setting must match your 16-bit software configuration.

### Interrupt

This is the interrupt (IRQ) line to be emulated by the virtual adapter card. Most programs do not need interrupt emulation.

### Emulated Adapter

This selection determines whether the virtual adapter will emulate the 1784-KT or 1784-KTX card. The choice of adapter will affect the memory addresses and interrupts that can be chosen.

### Message Timeout

This is the message timeout value for this virtual adapter card. It specifies the time that the Virtual DHX Driver should wait for reply messages before declaring a timeout condition.

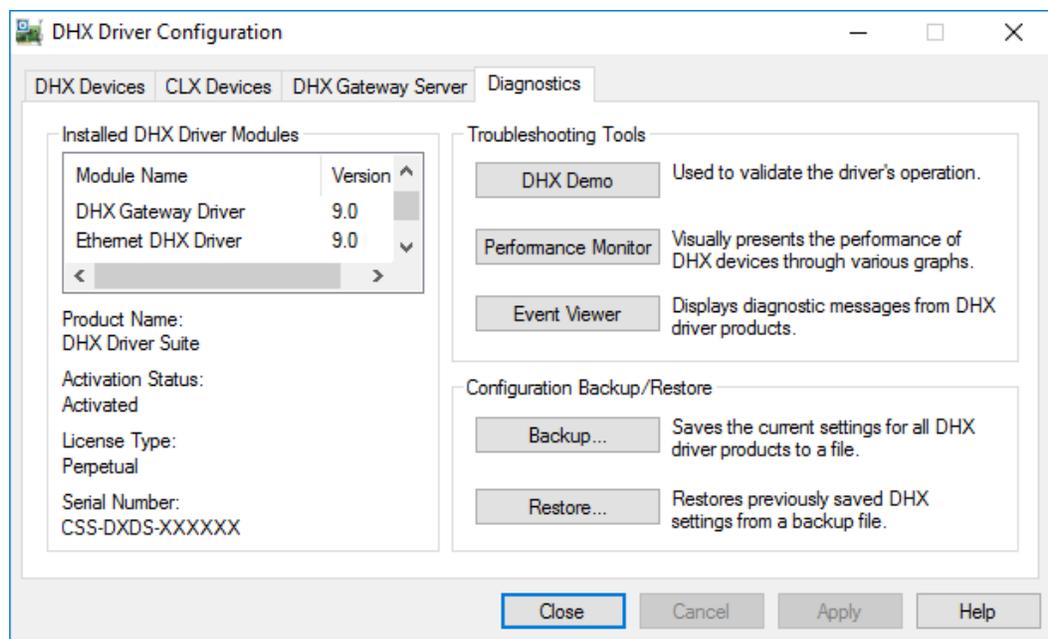
If you encounter communication timeouts, you should increase this value. For most applications, a 15-second timeout value is adequate.

### Mapped to DHX Device...

This is the DHX device that is used by this virtual adapter card for all of its communications. The DHX device must already have been configured and tested. If you have not done this, refer to the Configuration section of the appropriate DHX family driver, such as the DHX Driver, Ethernet DHX Driver or ControlLogix Gateway Driver.

## **Diagnostics Tab**

The diagnostic features help confirm that the driver is running and is properly configured. They also provide important help if troubleshooting or technical support is needed.



### ***Installed DHX Driver Products***

This area shows all DHX product components installed on your system, along with their version numbers. This information may be requested if you call for technical support. This screen also tells you if the software has been activated or if it is running in demo mode.

### ***Product Package***

DHX products are sold and installed as packaged suites, such as the DHX Driver Suite and DHX OPC Server Suite. This field indicates the suite that is installed on your system.

### ***Activation Status***

Most Cyberlogic software products operate in a time-limited demonstration mode until they are activated. This field tells you whether or not the installed product has been activated.

If your product requires activation, run the **Activation** wizard, which you will find in the Windows **Start** menu under **Cyberlogic Suites**. You will need the serial number and password that were assigned when you purchased your license for the software.

### ***License Type***

This field shows the licensing mode that the software is operating under. If the type displayed is 2 Hour Demo, the software will run for only two hours at a time, after which you must restart the system to obtain another two hours of use. To enable continuous, uninterrupted operation, you must activate the software.

### Serial Number

If you have activated the software by entering the serial number and password, the serial number used will be shown here. This will help you to determine which license goes with which of your systems.

### **Troubleshooting Tools**

The Troubleshooting Tools group provides shortcuts to diagnostic tools that help verify that the drivers are operating as expected. In case of communication problems, these tools will help in the diagnosis.

For details on how to use these tools, refer to the [Validation & Troubleshooting](#) section.

### DHX Demo

Run this program after configuring the driver to confirm that it is configured correctly and running properly.

### Performance Monitor

Click this button to launch the Windows Performance Monitor, which will allow you to observe numerous performance parameters in graphical form.

### Event Viewer

In case of communication difficulties, the Windows Event Viewer may provide error messages to guide you in troubleshooting problems.

### **Configuration Backup/Restore**

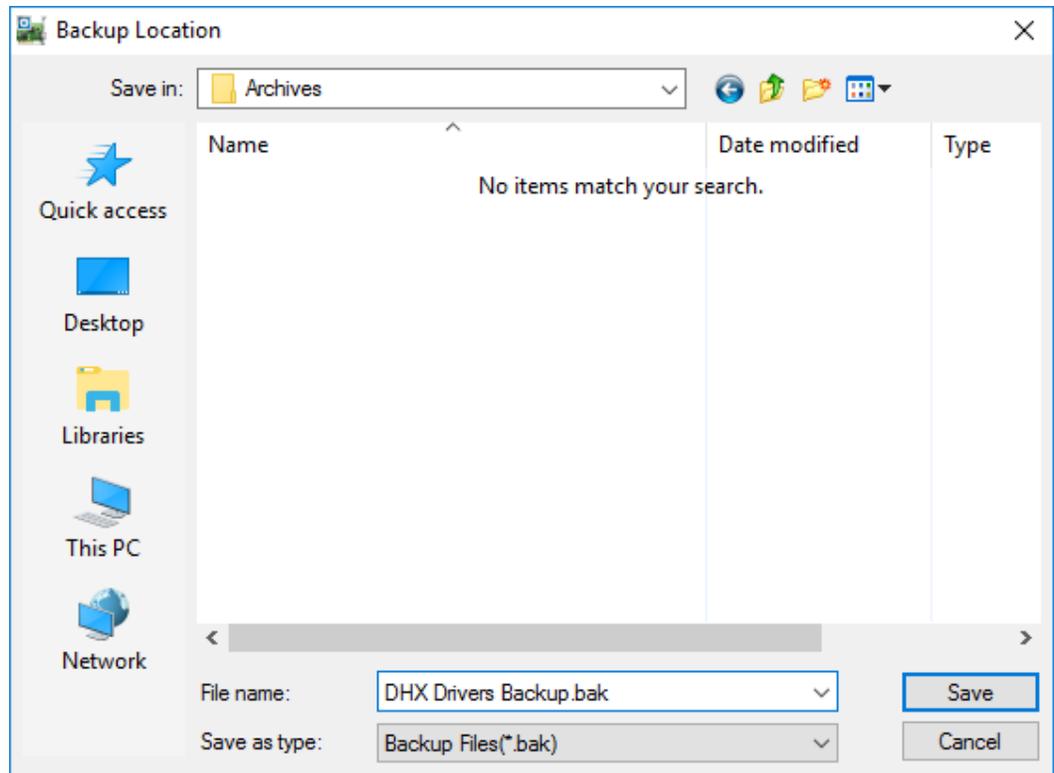
The Backup... and Restore... buttons in this group can be used to backup and restore configurations of all DHX family drivers on your system.

**Note** We strongly recommend that you backup your configuration data after the initial configuration and that you maintain up-to-date backups after every configuration change.

### Backup Configuration

Use this procedure to backup your configuration.

1. Click the **Backup...** button.

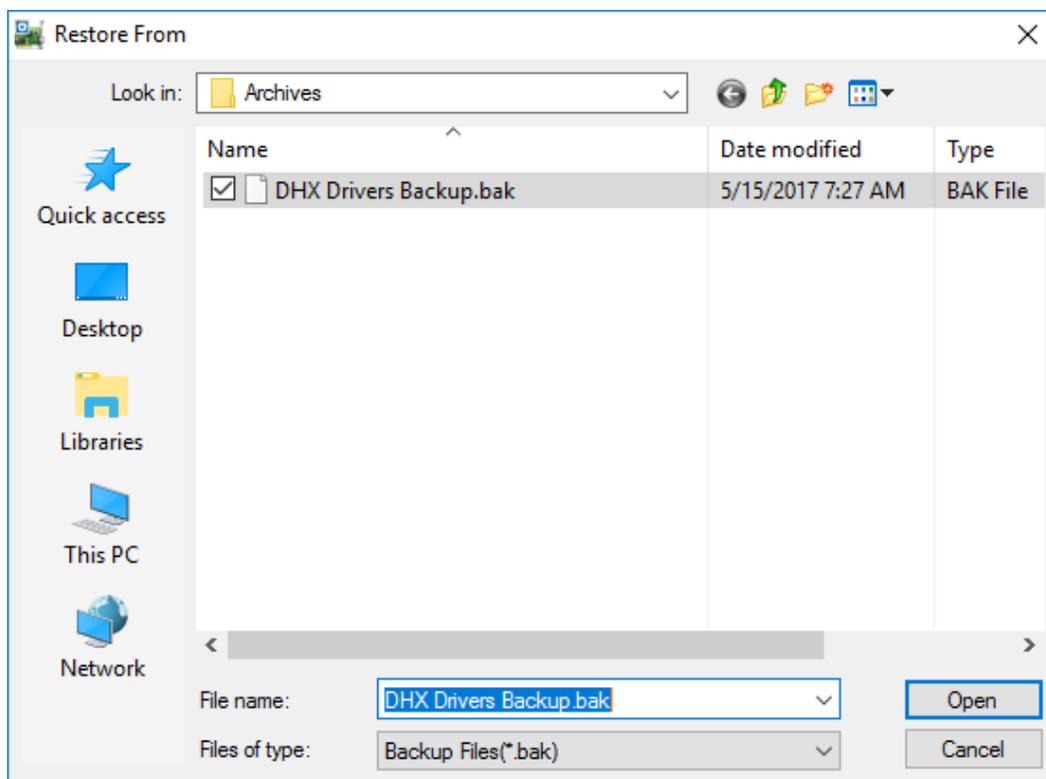


2. Browse for the backup directory. By default, the last-used directory will be selected.
3. Enter the **File name** you want to use for your configuration backup file, and then click the **Save** button to complete the backup operation.

### Restore Configuration

To restore a configuration that was previously backed up, use this procedure.

1. Click the **Restore...** button.



2. Browse for your configuration backup file. By default, the last used directory will be selected.
3. Select the backup file and click the ***Open*** button to complete the restore operation.

**Caution!**

After you finish restoring the configuration, restart the system to ensure proper operation of the restored devices.

### ***Configuration Backup/Restore Utility***

The DHX driver products also provide a utility program, CIDhxCfg.exe, that you can use to backup and restore DHX device configurations. The program is located in the \Program Files\Common Files\Cyberlogic Shared\ directory.

The utility accepts the following command line switches:

<i>/Save FileName</i>	Save configuration
<i>/Restore FileName</i>	Restore configuration
<i>/Q</i>	Quiet operation (No error or warning messages)
<i>/?</i>	Help
<i>/H</i>	Help

For example, to backup the configuration of all DHX devices to a file named DhxCfg.bak, located in the directory C:\Program Files\Common Files\Cyberlogic Shared\, use the following command line:

> CIDhxCfg /Save C:\Program Files\Common Files\Cyberlogic Shared\DhxCfg.bak

To restore the configuration that the previous command saved, use the following command:

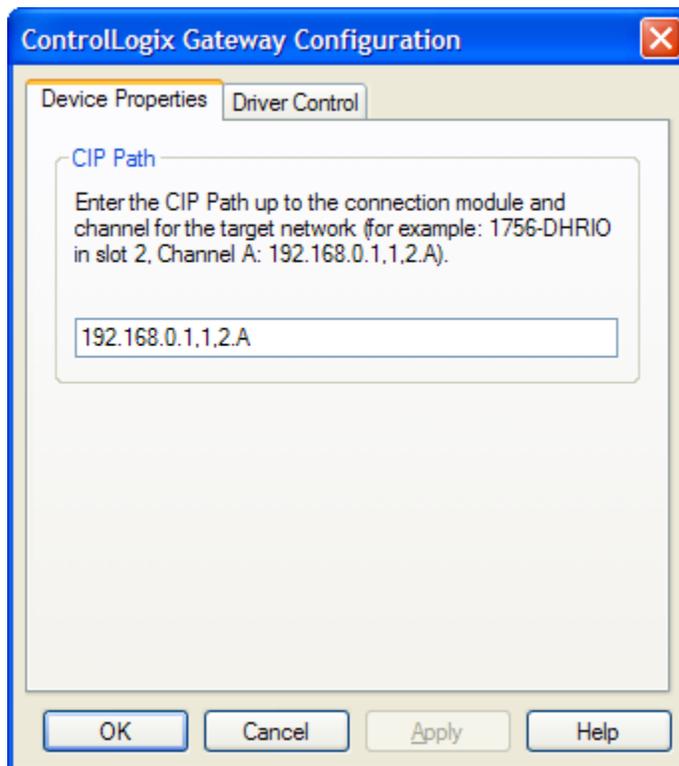
> CIDhxCfg /Restore C:\Program Files\Common Files\Cyberlogic Shared\DhxCfg.bak

You can use different file names to maintain different versions of your backups. However, for most users, a single backup is sufficient.

## ControlLogix Gateway Configuration Editor

When you create or edit a ControlLogix Gateway device, the DHX Driver Configuration editor dispatches the ControlLogix Gateway Configuration editor. This editor consists of two tabs, the [Device Properties Tab](#) and the [Driver Control Tab](#).

### Device Properties Tab

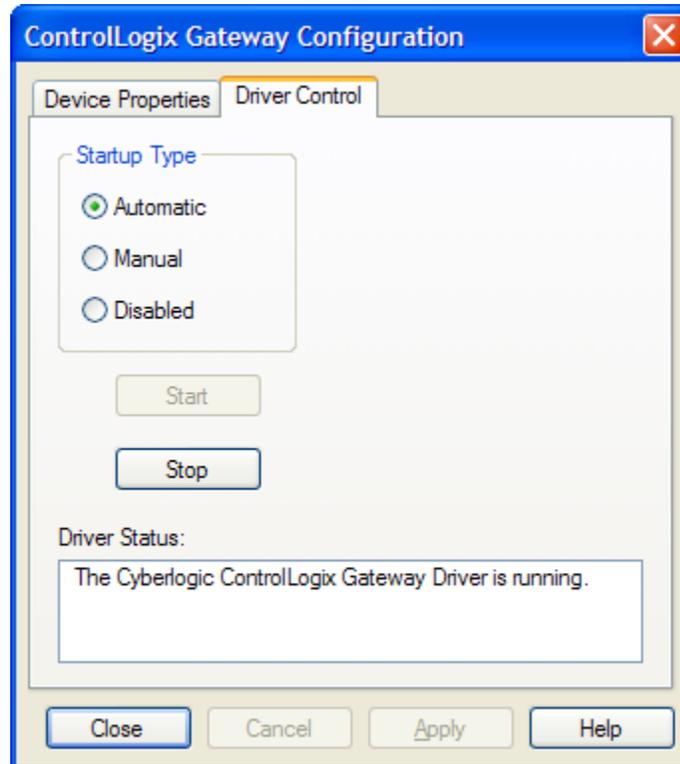


#### CIP Path

Here you must enter the CIP path up to the chassis, module and channel that communicates to the target Data Highway Plus network. This is not a complete CIP path, because it does not include the DH+ node address of the final destination. At run time, the driver will add that to the CIP path you enter here, thereby creating a complete CIP path.

Refer to [Appendix A: CIP Paths](#) for information on CIP path syntax.

## Driver Control Tab



The Driver Control tab allows you to select the startup type and monitor the current driver status.

**Note** These settings are global and common to all ControlLogix Gateway devices.

### Automatic

When this option is selected, the ControlLogix Gateway Driver will start when Windows boots.

### Manual

When this option is selected, the ControlLogix Gateway Driver will not start when Windows boots, but you can control it manually using the Start and Stop buttons.

### Disabled

When this option is selected, the ControlLogix Gateway Driver will not run.

### Start

In Automatic or Manual mode, click this button to start the ControlLogix Gateway Driver.

### Stop

In Automatic or Manual mode, click this button to stop the ControlLogix Gateway Driver.

### Driver Status

This tells you if the ControlLogix Gateway Driver is running, stopped, starting or stopping.

### **Selecting the Startup Type**

Select the desired mode among the Startup Type choices.

If you want the ControlLogix Gateway Driver to start whenever the system is booted, select **Automatic**. This is the recommended setting for systems that will use the ControlLogix Gateway Driver.

If you want to use the ControlLogix Gateway Driver and want to control it manually, choose **Manual**. The driver will not start on boot-up; instead you must use the Start and Stop buttons to control it.

If you do not want to use the ControlLogix Gateway Driver, choose **Disabled**.

### **Start/Stop the ControlLogix Gateway Driver**

Click the **Start** or **Stop** button.

## VALIDATION & TROUBLESHOOTING

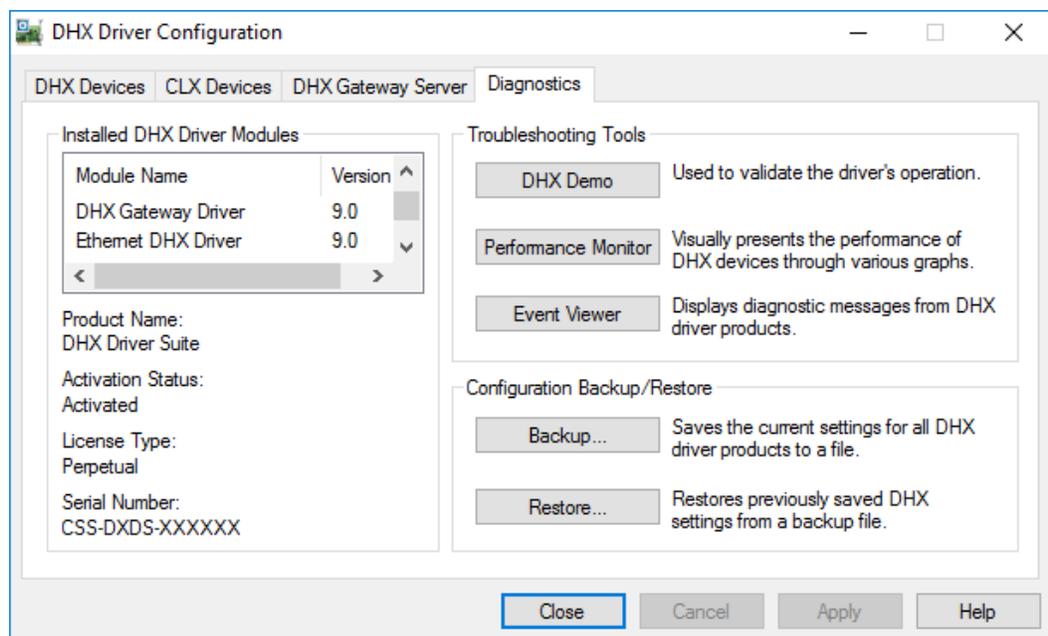
The following sections describe how the [DHX Demo](#) and [Performance Monitor](#) are used to verify that the DHX devices are configured correctly.

If you are having difficulties communicating through a DHX device, the troubleshooting sections can help you determine the nature of the problem. Included is a description of the [Event Viewer](#), a list of [ControlLogix Gateway Driver Messages](#) and a [Frequently Asked Questions](#) section.

### DHX Demo

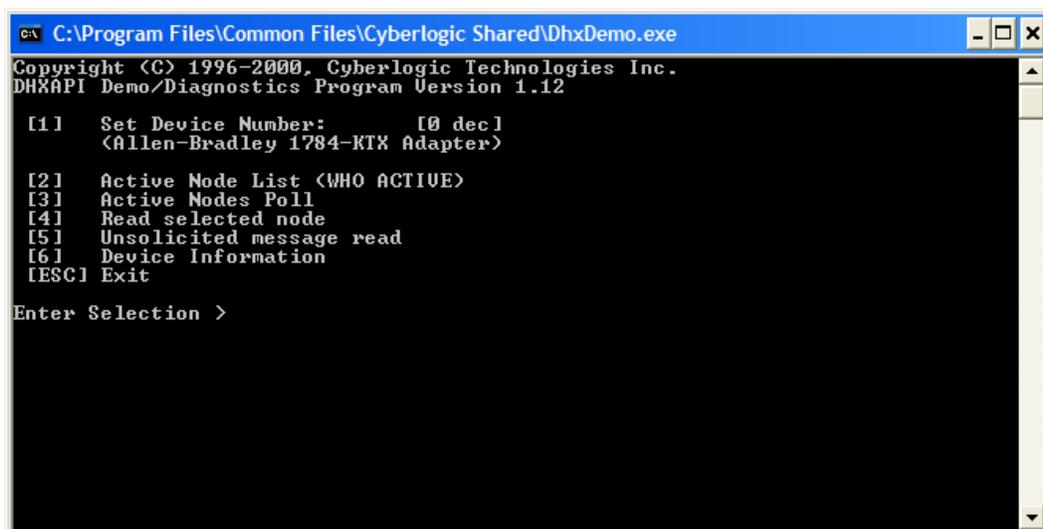
The DHX Demo program can be used to test all configured DHX devices in a system for proper operation. To run the program, open the Windows **Start** menu and locate the **Cyberlogic Suites** sub-menu. From there, go to **Diagnostics** and select **DHX Demo**.

Alternatively, open the **DHX Driver Configuration Editor**, go to the **Diagnostics** tab and click **DHX Demo**.



#### Main Menu

The DHX Demo will quickly access all available features of the configured DHX devices in your system, allowing you to verify their operation.

A screenshot of a Windows command prompt window titled "C:\Program Files\Common Files\Cyberlogic Shared\DhxDemo.exe". The window contains the following text:

```
Copyright (C) 1996-2000, Cyberlogic Technologies Inc.  
DHXAPI Demo/Diagnostics Program Version 1.12  
  
[1] Set Device Number: [0 dec]  
    <Allen-Bradley 1784-KTX Adapter>  
  
[2] Active Node List <WHO ACTIVE>  
[3] Active Nodes Poll  
[4] Read selected node  
[5] Unsolicited message read  
[6] Device Information  
[ESC] Exit  
  
Enter Selection >
```

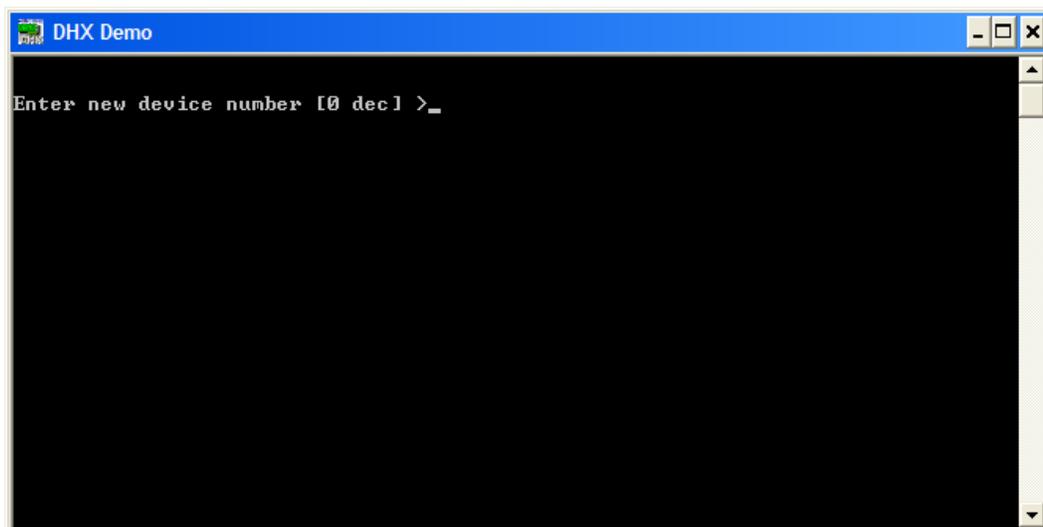
The simple command-line interface displays menu choices that take the user to secondary level screens.

Press **Esc** at any screen to return to the main menu shown above.

Press **Esc** in the main window to exit the program.

### **[1] Set Device Number**

When the DHX Demo program starts, the device number defaults to 0. To change it, press **1**.

A screenshot of a Windows command prompt window titled "DHX Demo". The window contains the following text:

```
Enter new device number [0 dec] >_
```

At the prompt, enter the desired device number and press the **Enter** key to change the selected device and return to the main menu.

Verify that the device type shown on the main menu matches the type you configured for the selected device number.

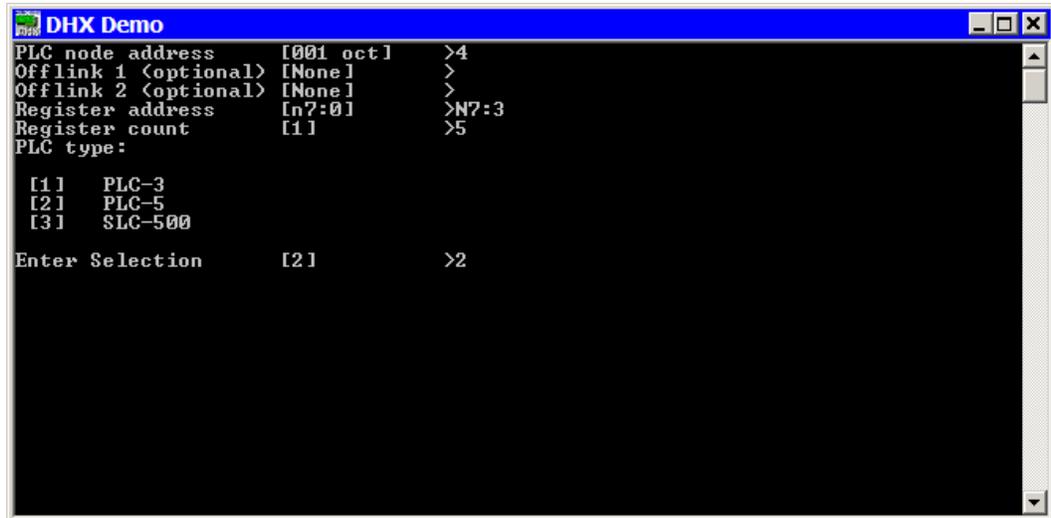


In the example shown, the three remote nodes have responded correctly, so there are three + signs followed by a 4 to indicate that there are four nodes—three remote and one local.

This function continuously interrogates the nodes with no delays between nodes or repetitions. Therefore, it is useful if you need a simple way to put a high load on the network.

#### [4] Read Selected Node

To read data from registers on a specific node, press **4**.



Enter the **PLC node address** you want to read from. Note that this value is entered in octal.

If you are using offlink addressing, enter the values for **Offlink 1** and **Offlink 2**.

Enter the **Register address** for the register you want to read. If you want to read from more than a single register, enter the first register's address.

Enter the **Register count**, which is the number of consecutive registers you want to read.

Enter your selection for the **PLC type** you are reading from.

In the example shown, we want to read from the PLC-5 at node address 4, without offlink addressing. We will read five consecutive registers beginning with N7:3, that is, registers N7:3 through N7:7.

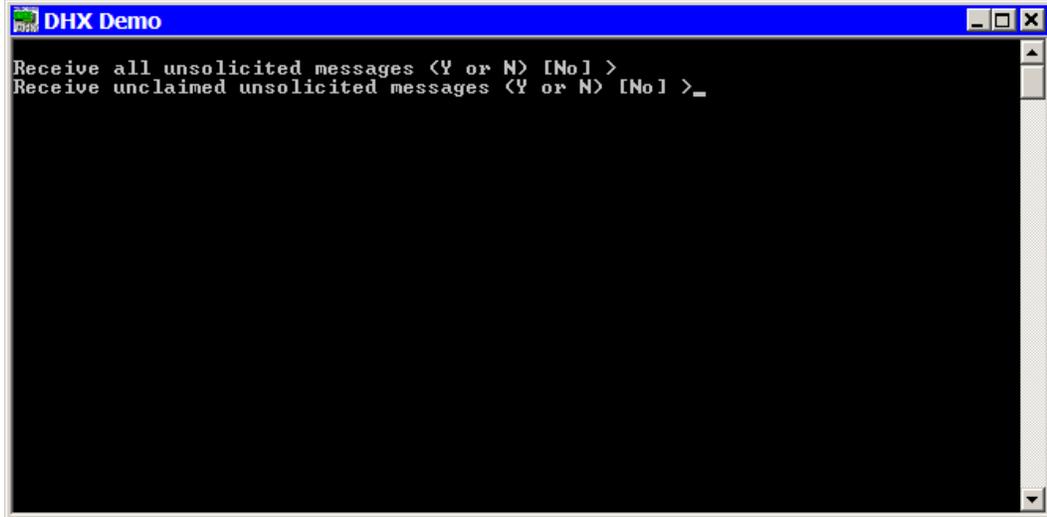
Press **Enter** to initiate the read. The requested data will be displayed on the screen. Press **Esc** to return to the main menu.

#### [5] Unsolicited Message Read

To read unsolicited messages, press **5**.

This is an advanced feature of DHX Demo and is primarily intended for use by software developers. Only the most basic operation is shown here.

To receive all unsolicited messages, press **Y**. If you want to receive only unclaimed messages, press **N**



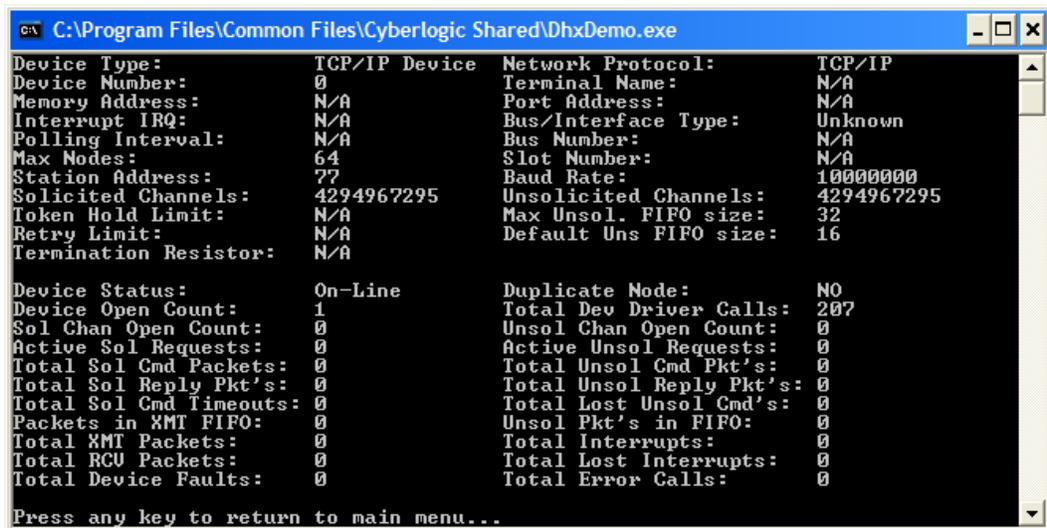
To receive all unsolicited messages, answer **Y** for the first question. The software will immediately begin receiving messages.

If you want to receive only unclaimed messages, answer **N** for the first question, then **Y** for the second. Again, the software will immediately begin receiving messages.

When an unsolicited message arrives, it will be displayed on the screen and the software will send a "success" response to the originating node. You may then press **N** to see the next message or **Esc** to return to the main menu.

### [6] Device Information

From the main menu, press **6** to launch the Device Information screen.



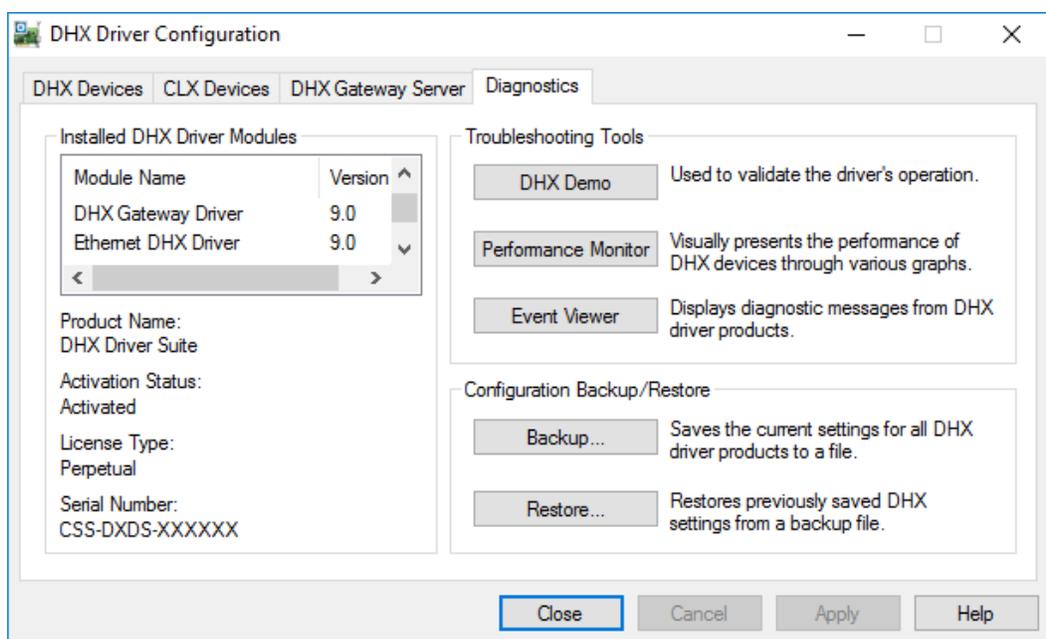
This screen shows configuration, statistical and diagnostic information about the driver, the device and the network.

After viewing the information, press **Esc** to return to the main menu.

## Performance Monitor

Microsoft provides a diagnostic tool, the Performance Monitor, as part of the Windows operating system. Applications supporting the Performance Monitor, including the DHX driver family, allow users to monitor relevant performance information. Multiple devices can be monitored simultaneously for comparison.

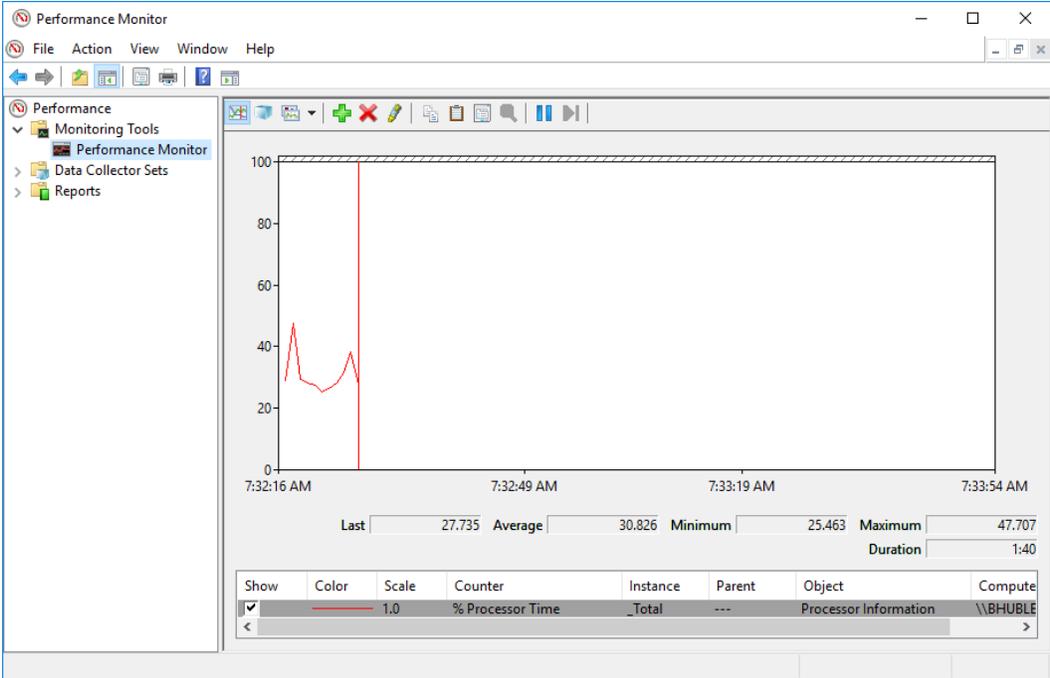
To run the program, open the Windows **Start** menu and locate the **Cyberlogic Suites** sub-menu. From there, go to **Diagnostics** and select **Performance Monitor**.



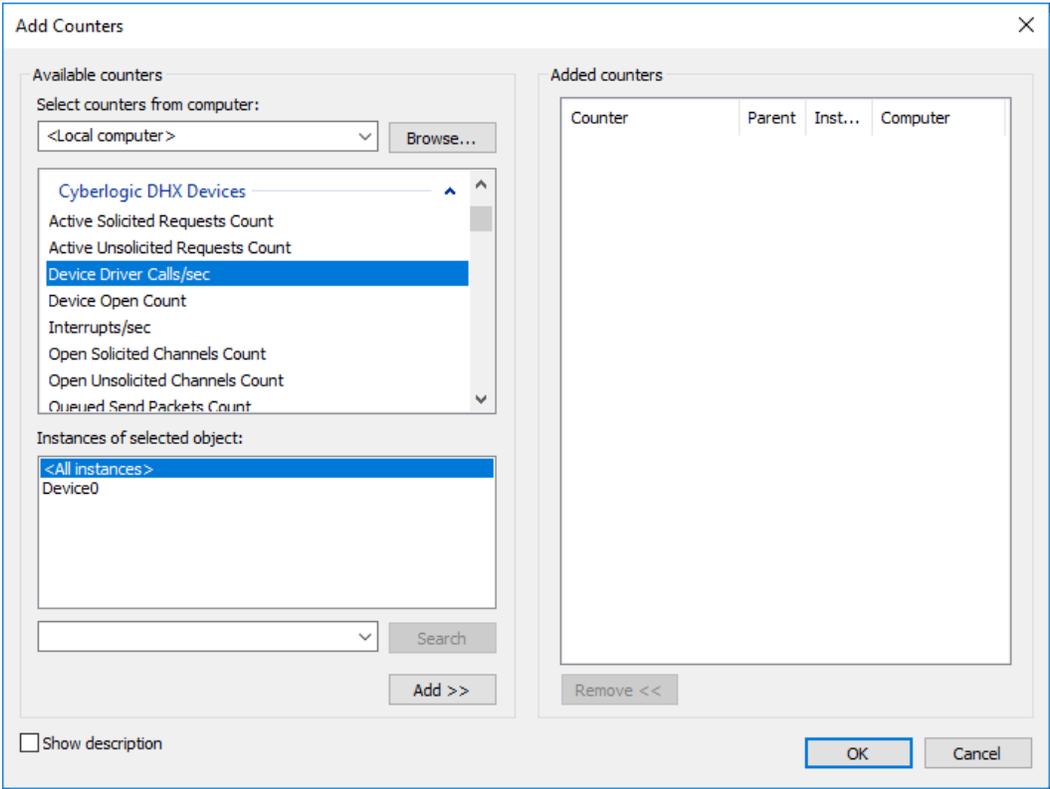
Alternatively, go to the Diagnostics tab of the DHX Driver Configuration Editor and click the **Performance Monitor** button.

### **How to Use the Performance Monitor**

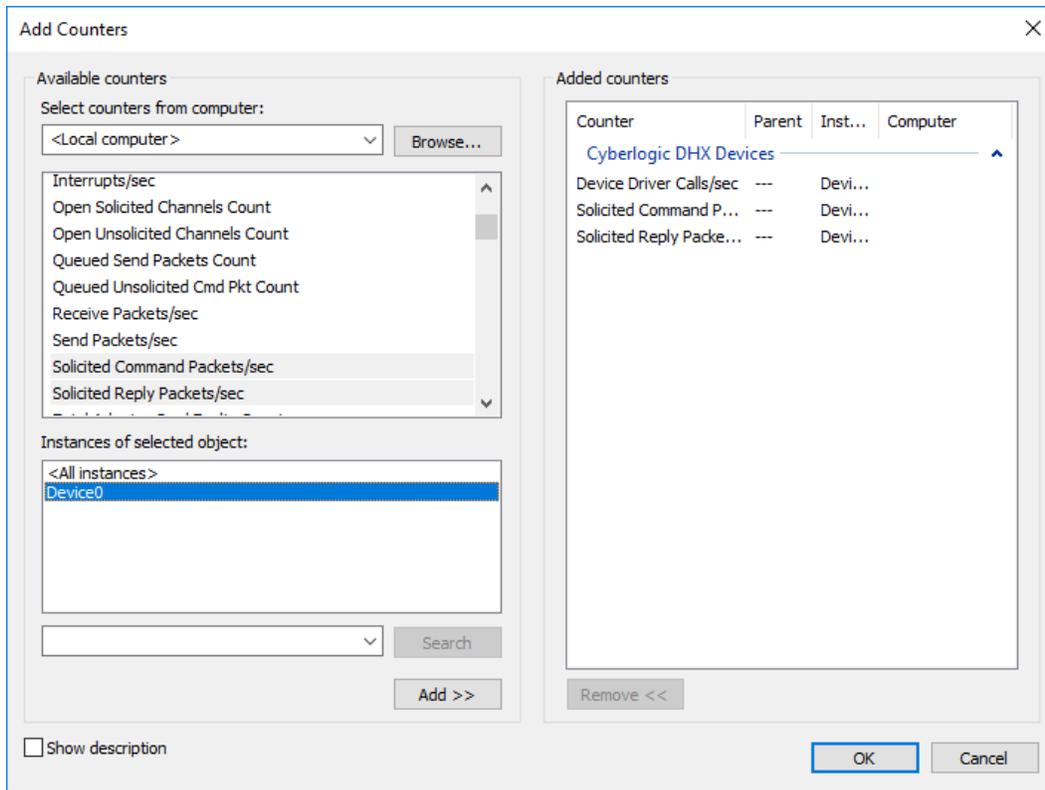
Since extensive help is provided for this program by Microsoft, only a few points relevant to the DHX family drivers are shown here.



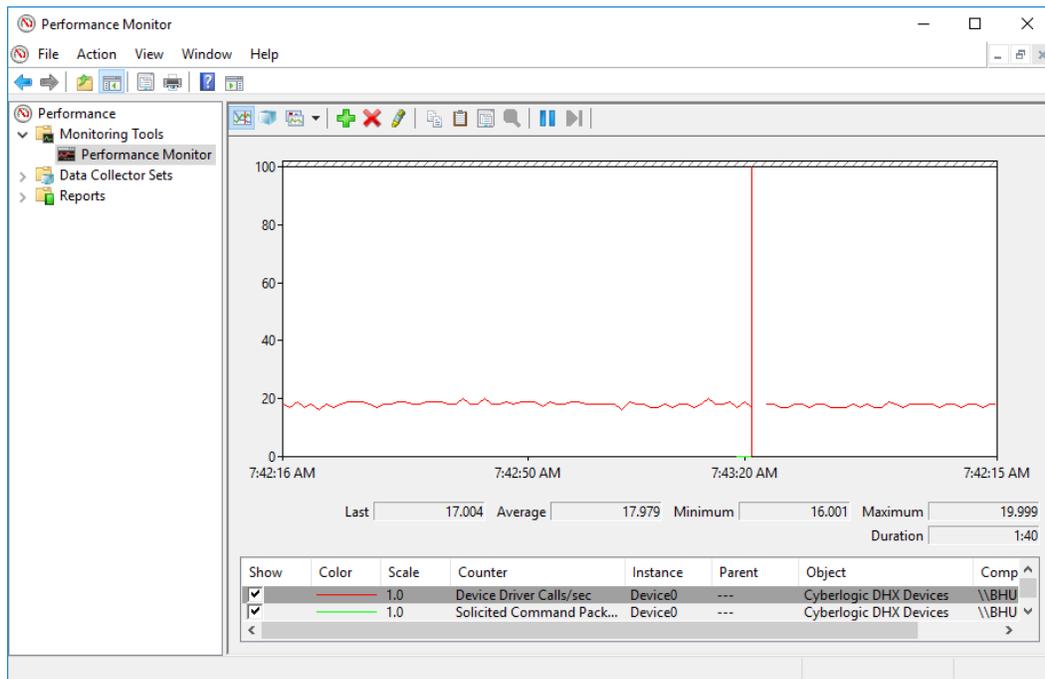
1. When the Performance Monitor program starts, click the **+** button on the tool bar.



2. Select **Cyberlogic DHX Devices** from the **Available counters** list.



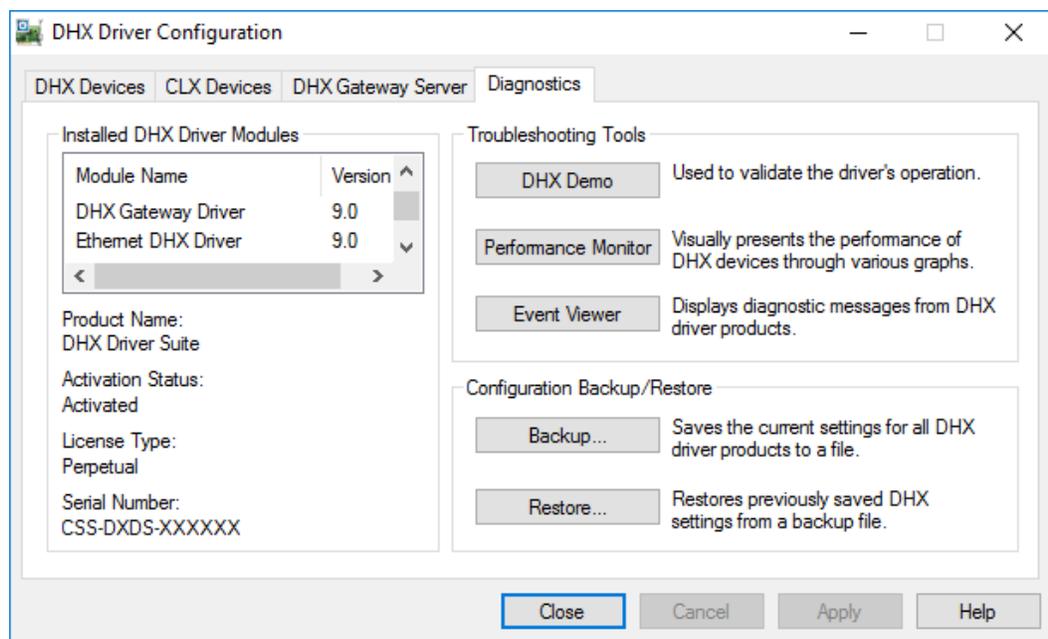
3. Choose a counter and the DHX device, and click **Add**. Repeat this for all the counters you want to view.
4. Click **OK**. The counters you chose will then be displayed in graphical format.



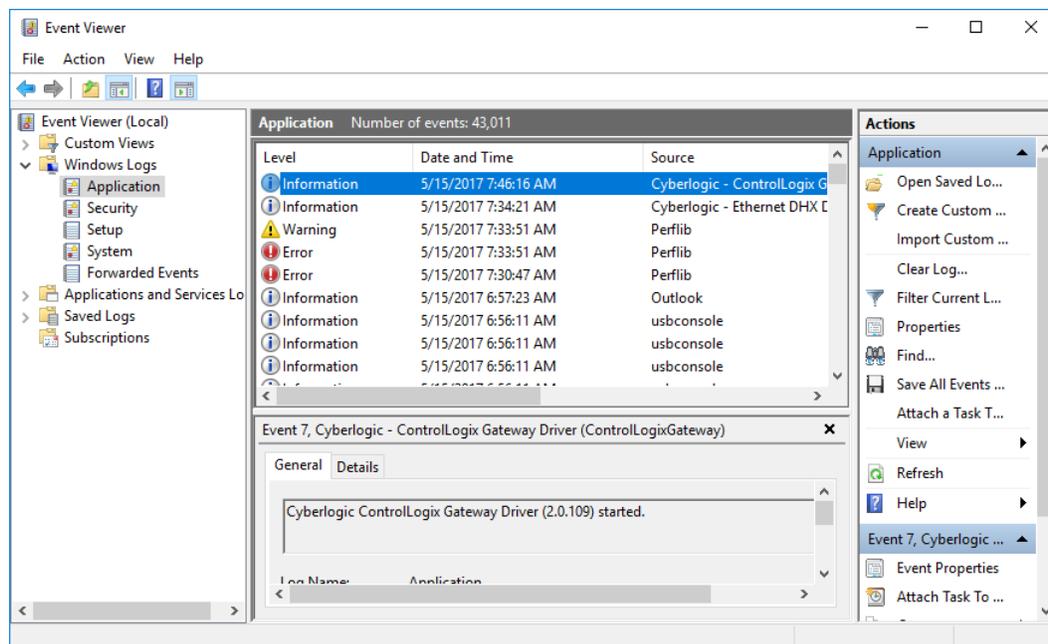
## Event Viewer

During startup and operation, the DHX drivers may detect problems or other significant events. When a noteworthy event is detected, the driver sends an appropriate message to the Windows Event Logger. You can view these messages using the following procedure.

1. Open the Windows **Start** menu and locate the **Cyberlogic Suites** sub-menu. From there, go to **Diagnostics** and select **Event Viewer**.



Alternatively, click the **Event Viewer** button on the Diagnostics tab of the DHX Driver Configuration Editor.

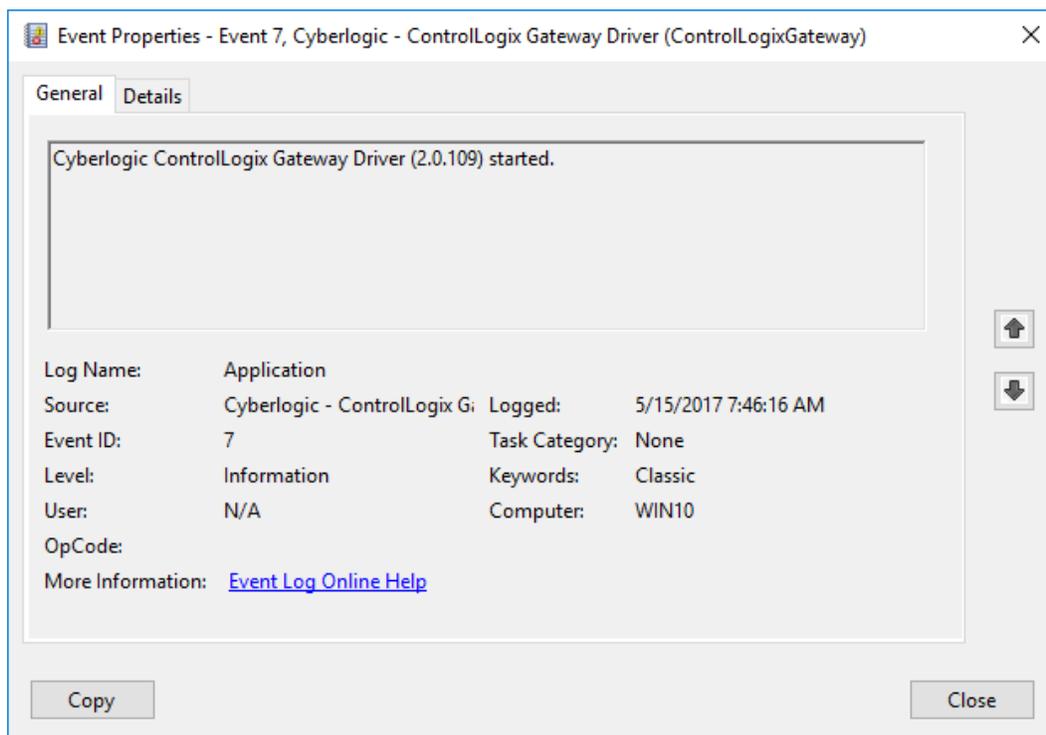


- If you are looking for entries relating to the DHX Driver, select **Windows Logs | System** from the Event Viewer tree. For other drivers, such as the ControlLogix Gateway Driver, Ethernet DHX Driver or Serial DHX Driver, select **Windows Logs | Application**.
- Look for entries with the name of the driver you are using in the **Source** column.

**Caution!**

The Event Viewer does not clear itself after rebooting. Check the time stamps of the messages to be sure that you are not looking at an old error message.

- Double-click on the desired entry to display a complete event message.



- For further descriptions of the event log messages, refer to the [ControlLogix Gateway Driver Messages](#) section.

## ControlLogix Gateway Driver Messages

### ***Helper DLL failed to load. Reinstall the product.***

A necessary DLL could not be loaded. This may indicate a corrupted installation. Repair the existing installation or remove and reinstall the software.

### ***Cyberlogic ControlLogix Gateway Driver is already running.***

The driver could not start because another copy of it is already running.

***Cyberlogic ControlLogix Gateway Driver (<Version Number>) started.***

The driver successfully started. The driver's version number may be requested if you call Cyberlogic Tech Support.

***Unable to initialize global system resources.***

The driver was unable to allocate enough memory to start. Close other open applications or add more memory to the system, and then try to restart the driver.

***Cyberlogic ControlLogix Gateway Driver service stopped because there are no ControlLogix Gateway devices configured.***

The driver shut down because there were no devices configured. To run the driver, create at least once ControlLogix Gateway device in the DHX Driver Configuration editor, and then restart the driver.

***Registration DLL failed to load. The I/O operations of the ControlLogix Gateway Driver have been disabled. Reinstall the product.***

A necessary registration DLL could not be loaded. This may indicate a corrupted installation. Repair the existing installation or remove and reinstall the software.

***Product license verification failed. The I/O operations of the ControlLogix Gateway Driver have been disabled. Reinstall the product.***

A registration check indicated that the software's evaluation time has expired. Run the Activation Wizard to authorize further use of the software.

***This is a <Number of Hours>-hour promotional copy of the ControlLogix Gateway Driver. The application started at <Start Time> and the driver will stop at <Stop Time>.***

This is a time-limited installation of the software. After the stop time, the driver will not allow any further I/O operations.

***This is a promotional copy of the ControlLogix Gateway Driver. The allowed operation time has expired. The I/O operations of the ControlLogix Gateway Driver have been disabled.***

This is a time-limited installation of the software. The stop time has been reached or exceeded, so the driver will not allow any further I/O operations.

***The Cyberlogic License Server failed to respond with valid license information. The I/O operations of the ControlLogix Gateway Driver have been disabled. Contact the manufacturer's technical support.***

The driver experienced a problem when it tried to contact the Cyberlogic License Server. If the license server is not running, start it and then try restarting the driver. If the license server is already running, contact Cyberlogic Tech Support.

## Frequently Asked Questions

### ***I've installed the software. What's next?***

Configure a logical device (ControlLogix Gateway device). Refer to the [Quick-Start Guide](#) section for guidance. After this is done, run the [DHX Demo](#) to test the driver.

### ***I've configured a ControlLogix Gateway Driver. How do I know that it's working?***

First, use the [DHX Demo](#) to confirm that the device is operating properly. Then, use the [Performance Monitor](#) as a benchmark reference. For more information, refer to the [Validation & Troubleshooting](#) section.

### ***In the DHX Demo, when I select "Active Node List" or "Device Information," I get an error that says "The system cannot find the file specified (Error code 1806)."***

Cause 1: Be sure that at least one ControlLogix Gateway Driver has been configured. If not, refer to the [Quick-Start Guide](#) section for details on setting up a ControlLogix Gateway Driver.

Cause 2: The ControlLogix Gateway Driver could not find the DHX device specified under Device Number. Refer to the [DHX Devices Tab](#) section for details on finding and entering this information.

### ***I have two ControlLogix Gateway Driver devices configured in the system. How do I communicate through the second one?***

The DHX Demo uses the device number to determine which card to use. The menu function *[1] Set device number* lets you choose which configured ControlLogix Gateway Driver device the demo will use. If you are using some other software product, contact the manufacturer for more information on using multiple devices.

## APPENDIX A: CIP PATHS

The configuration of ControlLogix Gateway devices requires you to specify the Control and Information Protocol (CIP) path to be used for communication. This appendix discusses the syntax of the CIP path and provides examples of typical paths.

For additional information on CIP path configuration, refer to Allen-Bradley's *ControlLogix Data Highway Plus-Remote I/O Communication Interface Module 1756-DHRIO User Manual*, available as A-B publication number 1756-UM514B-EN-P.

### General Syntax

This section explains the general syntax used for all CIP paths. The specific format used for a given configuration will depend on the driver, hardware and network setup. Refer to the example sections for details.

The CIP path is an addressing method used to identify a target device by specifying each step of the route to that device. By default, all numeric values in the CIP path are assumed to be decimal, unless specified otherwise. Path fields are separated by commas.

A CIP path can have two forms:

- address, port, address, etc.
- port, address, port, address, etc.

Extra <port, address> pairs can be added as necessary to either form.

In the second form, the leading port number is disregarded by the Cyberlogic drivers. This form is supported for compatibility with RSLinx/RSLogix 5000.

#### **Address Fields**

The address fields can take many forms, depending on the type of network used. These are shown below with examples of each.

##### Ethernet

Form	Example
<IP Address>	192.168.1.12
<IP Address>:<IP Port>	192.168.1.12:32767
<DNS Name>	sta3r
<DNS Name>:<IP Port>	sta3r:16385

#### **Note**

In the table above, the forms that include <IP Port> are to be used when it is necessary to override the default IP port. The specified IP port is part of the address field and does not take the place of the port field in the CIP path syntax.

*Data Highway Plus Node*

<b>Form</b>	<b>Example</b>
<Octal station number>	8#17
<Decimal station number>	15

*DF1 Network*

<b>Form</b>	<b>Example</b>
<Decimal station number>	254

*ControlNet Network*

<b>Form</b>	<b>Example</b>
<Decimal station number>	99

*ControlLogix backplane*

<b>Form</b>	<b>Example</b>
<Decimal slot number>	1

**Port Fields**

PLCs, modules and other components may have ports associated with them, through which the message can be routed to another address. The most common port assignments are shown in the table below.

In the case of Data Highway Plus ports, an alternative method is to use .A or .B appended to the slot number instead of using the number to specify the port. Thus, to address channel A of a 1756-DHRIO module in slot 3, you could use either 3, 2 or 3.A. For channel B, your choices would be 3, 3 or 3.B.

DH-485 ports are always addressed using the .A or .B notation.

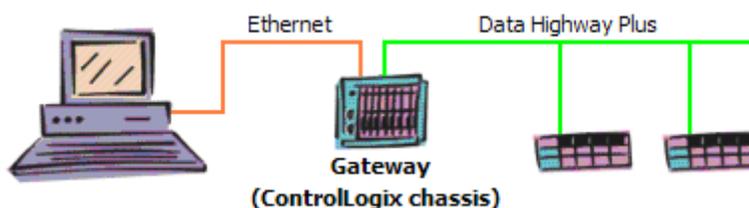
Component	Port	Assigned Number
All ControlLogix chassis	Backplane	1
Processor	DF1 Port	2
1756-ENET or 1756-ENBT	Ethernet Port	2
1756-CNB	ControlNet Port	2
1756-DHRIO	DH+ Port (Channel A)	2
1756-DHRIO	DH+ Port (Channel B)	3
1761-NET-ENI	DF1 Port	3
1756-DH485	DH-485 Ports	Use .A or .B notation

## ControlLogix Gateway Driver Examples

The ControlLogix Gateway Driver uses a special syntax in its configuration. It is of the form *address, port, address, port*. Note that this is an incomplete CIP path, because it ends with a port, rather than an address.

When you configure the CIP path for the ControlLogix Gateway Driver, you are really configuring only the beginning of the path. That is, you are specifying the path only up to the port on the 1756-DHRIO or 1756-DH485 module in the gateway chassis, omitting the final address. This address is the destination node for the message, and it will be appended to the configured CIP path by the driver, as it processes the message.

### ***IP Address and Typical Port Syntax***



In this example, a ControlLogix Gateway Driver device is configured to send messages to controllers on a Data Highway Plus network by passing them through a 1756-DHRIO module in a ControlLogix chassis.

*192.168.9.2, 1, 4.B*

The message is addressed to the Ethernet module in the chassis used as the gateway, then it goes across the backplane to the Data Highway Plus module. Notice that the path does not specify the DH+ node address of the destination device.

*192.168.9.2:* Addresses an Ethernet module at this IP address

*1:* Uses the ControlLogix backplane port

*4.B:* Addresses the 1756-DHRIO module in slot 4, and uses its DH+ port B

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

### ***IP Address and Alternative Port Syntax***

This is the same as the previous example, but here we use the alternative method of specifying the DH+ channel.

*192.168.9.2, 1, 4, 3*

The message routing is identical to the previous example, because the 4, 3 form is exactly the same as the 4.B form.

*192.168.9.2:* Addresses an Ethernet module at this IP address

*1:* Uses the ControlLogix backplane port

*4:* Addresses the 1756-DHRIO module in slot 4

*3:* Uses DH+ port B of the 1756-DHRIO module

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

### ***DNS Name***

In this example, the message goes to an Ethernet module with the DNS name *AssemblyLineA*, and is routed through the gateway chassis in the same manner as in the previous example.

*AssemblyLineA, 1, 2.A*

The routing in this case is handled the same way as the previous examples, but this time using the DNS name. Notice also that in this example we use port A of the DH+ module, which is in slot 2.

*AssemblyLineA:* Addresses an Ethernet module with this DNS name

*1:* Uses the ControlLogix backplane port

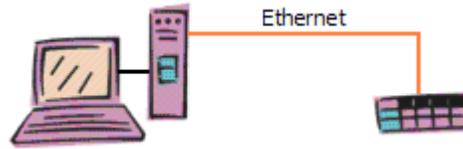
*2.A:* Addresses the 1756-DHRIO module in slot 2, and uses its DH+ port A

(The destination DH+ node address is not specified, but will be appended by the driver at runtime.)

## **Ethernet DHX/CIP Examples**

These are examples of how to configure CIP paths for an Ethernet DHX/CIP device.

### ***Ethernet to MicroLogix 1100, SLC5/05 or PLC-5***



In this example, we are addressing a MicroLogix 1100, SLC5/05 or PLC-5 processor using an Ethernet DHX/CIP device.

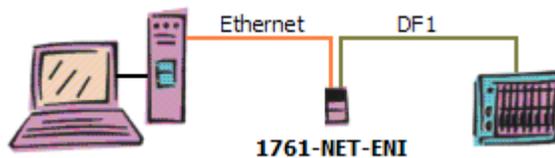
*192.168.33.117*

There is no backplane port or slot to address, so the CIP path is simply the IP address.

**Caution!**

Only the more recent versions of SLC5/05 and PLC-5 controllers can use the Ethernet DHX/CIP Driver. The older versions use the Ethernet DHX Driver.

### ***1761-NET-ENI Module***



The Allen-Bradley 1761-NET-ENI module is used to bridge from an Ethernet network to the serial port on a PLC. In this example, an Ethernet DHX/CIP device communicates to the 1761-NET-ENI module, which then passes the information through its serial DF1 port to the serial port on the processor.

The CIP path you must use with this module depends on its firmware revision level.

#### *Firmware Rev. A*

*192.168.1.77*

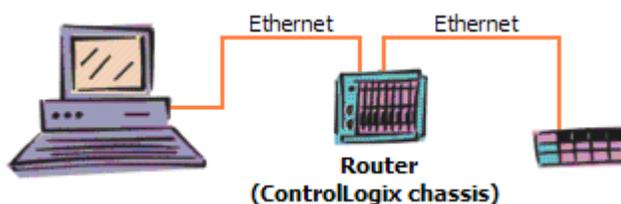
For firmware revision A, simply use the IP address of the module.

#### *Firmware Rev. B-D*

*192.168.1.77, 3, 1*

For firmware revisions B-D, the IP address alone may work, but it may be necessary to use *<IP address>, 3, 1*. In this case, the 3 is the port number for the DF1 port and 1 is the default address for the device connected via the serial link.

### **ControlLogix Chassis Ethernet Router**



For this example, we have created a router by installing two Ethernet modules in a ControlLogix chassis, and will use this to pass messages from an Ethernet DHX/CIP device on one Ethernet network to a logic controller on another Ethernet network.

**Caution!** When used with the Ethernet DHX/CIP Driver, this type of router can be used only for configurations in which the final destination device is a MicroLogix 1100, SLC5/05 or PLC-5.

*10.3.54.101, 1, 5, 2, 192.168.65.6*

The message is sent to one of the modules, which passes it along the ControlLogix backplane to the other module, which then sends it along to the final destination.

*10.3.54.101*: Addresses an Ethernet module at this IP address

*1*: Uses the ControlLogix backplane port

*5*: Addresses the Ethernet module in slot 5

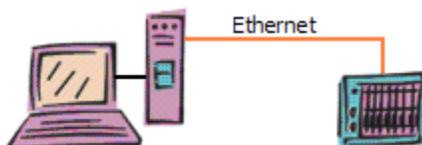
*2*: Specifies the module's Ethernet port

*192.168.65.6*: The IP address of the final destination of the message

## **Ethernet CLX Examples**

These are examples of how to configure CIP paths for an Ethernet CLX device. This type of device is available only on systems that have the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite installed.

### **Ethernet to ControlLogix Processor**



In this example, the Ethernet CLX device sends a message directly to a ControlLogix chassis that is the final destination.

*192.168.1.2, 1, 0*

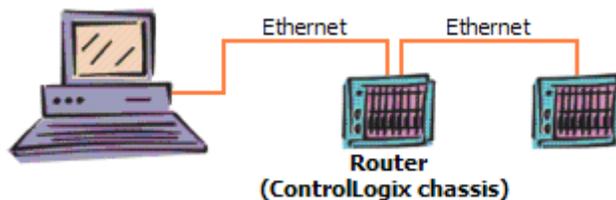
The message goes to an Ethernet module at the specified IP address. It must then go across the backplane to the processor module.

*192.168.1.2*: Addresses an Ethernet module at this IP address

*1*: Uses the ControlLogix backplane port

*0*: Addresses the processor module in slot 0

### **ControlLogix Chassis Ethernet Router**



This example has the Ethernet CLX device send the message to a ControlLogix chassis, which routes it to another Ethernet network, and on to its final destination.

*10.8.2.124, 1, 3, 2, 10.9.2.78, 1, 0*

The message goes to an Ethernet module in a ControlLogix chassis, then goes across its backplane to another Ethernet module. From there, the message goes to another ControlLogix chassis, where it crosses the backplane to a processor module.

*10.8.2.124*: Addresses an Ethernet module at this IP address

*1*: Uses the ControlLogix backplane port

*3*: Addresses the second Ethernet module, which is in slot 3

*2*: Uses the module's Ethernet port

*10.9.2.78*: Addresses an Ethernet module at this IP address

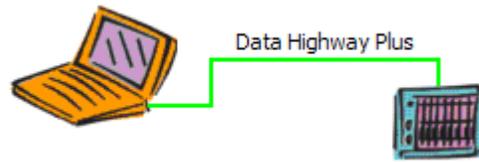
*1*: Uses the ControlLogix backplane port

*0*: Addresses the processor module in slot 0

## **CLX over DHX Examples**

These are examples of how to configure CIP paths for a CLX over DHX device. This type of device is available only on systems that have the DHX OPC Server Suite, DHX OPC Premier Suite or DHX OPC Enterprise Suite installed.

### ***Data Highway Plus to ControlLogix Processor – Decimal Address***



This is a simple example in which the CLX over DHX device directly addresses a ControlLogix processor on a DH+ network.

*31, 1, 2*

Here we address a Data Highway Plus module in a chassis, then go across the backplane to the processor module.

*31:* Addresses a DH+ module at station address 31

*1:* Uses the ControlLogix backplane port

*2:* Addresses the processor module in slot 2

### ***Data Highway Plus to ControlLogix Processor – Octal Address***

This is identical to the previous example; only the addressing method is different.

*8#37, 1, 2*

This is functionally the same as the previous example, except here we specify the address in octal.

*8#37:* Addresses a DH+ module at octal station address 37

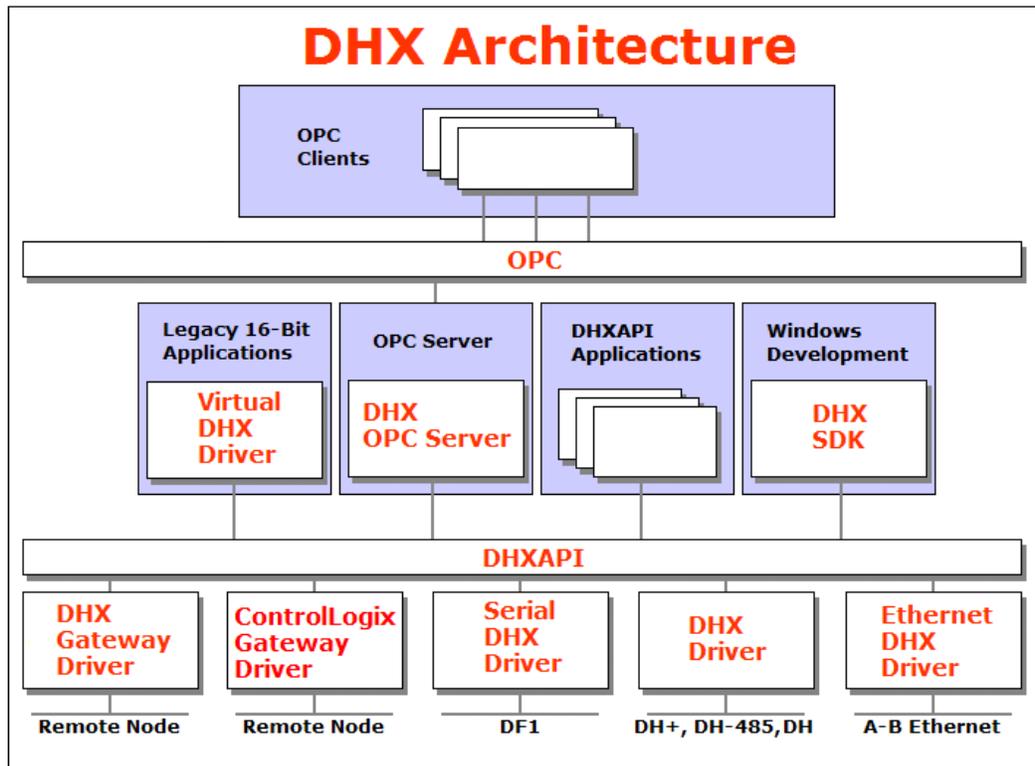
*1:* Uses the ControlLogix backplane port

*2:* Addresses the processor module in slot 2

## APPENDIX B: DHX ARCHITECTURE AND COMPANION PRODUCTS

The ControlLogix Gateway Driver is part of the Cyberlogic DHX family. This family consists of several well-integrated products that provide connectivity for Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks in distributed environments.

This section illustrates the layout of the DHX architecture. It includes a description of each DHX component along with suggested methods for employing them to support Allen-Bradley networks.



*The DHX architecture presents a consistent framework to address different connectivity needs.*

### DHX Driver

The DHX Driver provides connectivity between Windows-based applications and interface adapter cards from Allen-Bradley and SST. A few of the many cards supported are the 1784-PKTX and 1784-PCMK from Allen-Bradley, as well as the SST DHP-PCI and 5136-SD-PCI from SST. These provide communication over Data Highway, Data Highway Plus and DH 485.

The kernel mode device driver of the DHX Driver has exceptional performance and stability. It operates in either interrupt or polled mode and fully implements all network features, including solicited and unsolicited communication. The high performance native

API (DHXAPI) of the DHX Driver takes full advantage of the event-driven, multitasking, multithreaded features of Windows operating systems.

The driver includes the DHX Gateway Server for remote access by the DHX Gateway Driver and is fully compatible with all other components of the DHX family.

The DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## **Ethernet DHX Driver**

The Cyberlogic Ethernet DHX Driver emulates Data Highway Plus over the Ethernet TCP/IP protocol. It supports most DHXAPI and 6001-F1E-compatible software, providing instant access to Ethernet TCP/IP compatible devices without code modifications. It is compatible with all Ethernet cards supported by Windows.

The driver includes the DHX Gateway Server for remote access by the DHX Gateway Driver and is fully compatible with all other components of the DHX family.

The Ethernet DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## **Serial DHX Driver**

The Cyberlogic Serial DHX Driver provides connectivity to full-duplex DF1-compatible devices through standard serial COM ports. These devices include the 1770-KF2, 1785-KE, 1770-KF3 and 1770-KFC15 interface modules for Data Highway, Data Highway Plus, DH-485 and ControlNet, as well as direct connection to devices with full-duplex DF1-compatible ports. The Serial DHX Driver supports both the DF1 BCC and DF1 CRC-16 protocols.

The driver includes the DHX Gateway Server for remote access by the DHX Gateway Driver and is fully compatible with all other components of the DHX family.

The Serial DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## **DHX Gateway Driver**

The DHX Gateway Driver lets applications use DHX devices on remote DHX Gateway Server nodes as though they were on the local system. The client system running the DHX Gateway Driver must be a Windows node connected over a standard LAN to another system running the DHX Gateway Server. It can then access the Data Highway, Data Highway Plus, DH-485 and ControlNet networks that are connected to the server node.

For example, the DHX Gateway Driver provides complete DHX Driver functionality to the client node applications. An interface adapter, such as a 1784-PCMK card, is not required on the client node. DHX Gateway Driver nodes can communicate with multiple remote servers and all Windows-compatible TCP/IP networks are supported.

The DHX Gateway Driver is compatible with all other components of the DHX family.

The DHX Gateway Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## **ControlLogix Gateway Driver**

The ControlLogix Gateway Driver lets applications access Data Highway Plus networks from a remote location through a ControlLogix gateway module. With this driver, a remote system can communicate over a standard Ethernet network to a ControlLogix chassis containing a 1756-DHRIO module. That module then acts as a gateway to a Data Highway Plus network. This allows the remote system to access the PLC-5s, SLC-500s and any other devices on the Data Highway Plus network as though it were connected directly to that network.

The ControlLogix Gateway Driver is fully compatible with all other components of the DHX family.

The ControlLogix Gateway Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## Virtual DHX Driver

The Virtual DHX Driver allows 16-bit DOS and Windows applications using 1784-KT/KTX interface adapters to run concurrently with 32-bit applications on the same computer. It allows multiple 16-bit applications and multiple instances of a single 16-bit application to run under the latest Windows operating systems. By emulating the physical 1784-KT/KTX adapters, the Virtual DHX Driver will work with all legacy software, regardless of which DOS driver is used.

If your computer uses Windows 7 or the 64-bit edition of any Windows version, refer to Cyberlogic Knowledge Base article *KB2010-02 Running 16-Bit Applications* for important information on using the Virtual DHX Driver on your system.

The Virtual DHX Driver is fully compatible with all DHX components and requires at least one of these drivers to operate:

- DHX Driver
- Ethernet DHX Driver
- Serial DHX Driver
- DHX Gateway Driver
- ControlLogix Gateway Driver

The Virtual DHX Driver is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite
- DHX Driver Suite

## DHX OPC Server

The Cyberlogic DHX OPC Server connects OPC-compliant clients to Data Highway, Data Highway Plus, DH-485, ControlNet and Ethernet networks. It supports the latest OPC Data Access and OPC Alarms and Events specifications and uses the DHX drivers for connectivity to Allen-Bradley networks.

The DHX OPC Server supports multiple, priority-based access paths for reliable, redundant communications. It also supports both solicited and unsolicited communications and uses an advanced transaction optimizer to guarantee minimum load on your networks. With only a couple of mouse clicks, the DHX OPC Server will

automatically detect and configure the attached networks and node devices. Other noteworthy features include DirectAccess, Data Write Protection and Health Watchdog.

The DHX OPC Server is included in the following products:

- DHX OPC Enterprise Suite
- DHX OPC Premier Suite
- DHX OPC Server Suite

## **DHX SDK**

Software developers can use the DHX Software Development Kit to provide connectivity to Data Highway, Data Highway Plus, DH-485, Ethernet and ControlNet networks from their 32-bit and 64-bit C/C++/C# applications.

The SDK supports 6001-F1E and Cyberlogic's high-performance DHXAPI and DHXAPI.Net interfaces. The 6001-F1E interface is an excellent bridge for developers who would like to port their 16-bit applications to the latest Windows environments. Developers of new applications can use any of the three interfaces. For a complete 6001-F1E specification, contact any Allen-Bradley distributor.

Since all DHX family drivers are built on the same DHX architecture, applications developed with the DHX SDK can be used with all DHX family drivers and can execute under all current Windows operating systems.